EFFICACY OF DVD TECHNOLOGY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE SELF-MANAGEMENT EDUCATION OF RURAL PATIENTS

A Dissertation

by

MICHAEL LELAND STELLEFSON

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2008

Major Subject: Health Education

EFFICACY OF DVD TECHNOLOGY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE SELF-MANAGEMENT EDUCATION OF RURAL PATIENTS

A Dissertation

by

MICHAEL LELAND STELLEFSON

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Approved by:

Chair of Committee,	Danny Ramsey Ballard
Committee Members,	James Michael Eddy
	Jerry Don Chaney
	Rafael Lara-Alecio
	Beth Hensleigh Chaney
Head of Department,	Richard Kreider

December 2008

Major Subject: Health Education

ABSTRACT

Efficacy of DVD Technology in Chronic Obstructive Pulmonary Disease Self-Management Education of Rural Patients.

(December 2008)

Michael Leland Stellefson, B.S., The University of Pittsburgh;
M.S., Texas A&M University
Chair of Advisory Committee: Dr. Danny Ramsey Ballard

Despite the efficacy of pulmonary rehabilitation programs which assist patients in managing chronic obstructive pulmonary disease (COPD), the high costs and lack of availability of such programs pose considerable barriers for underserved COPD patients, such as those living in rural communities. Because of this, patients are encouraged to actively *self-manage* COPD. Unfortunately, COPD patients have reported dissatisfaction with the self-management education they are provided. This mixed methods study assessed the self-management learning needs of COPD patients treated at a Certified Federal Rural Health Clinic through conducting focus group interviews (n = 2) to inform the development a targeted self-management education DVD. The effectiveness of 3 distinct educational treatments (DVD vs. Pamphlet vs. DVD + Pamphlet) was evaluated by comparing outcomes related to informational needs, self-management self-efficacy, and generic/lung-specific HRQoL in a randomly-assigned, multiple-group pretest-posttest design with a control group (n = 41).

Focus group data was analyzed using three qualitative analysis tools. Findings from the interviews indicated that patients viewed self-management as simply taking prescribed medications and reducing activity. Patients reported a lack of knowledge and skill development related to rehabilitative activities such as controlled breathing and stress reduction.

A multivariate analysis of covariance was conducted to determine the effect of 3 educational treatments on multiple outcome measures. Three nontrend orthogonal planned contrasts were tested to determine selected contrast effects. The data analysis revealed that participants receiving a DVD reported statistically significantly higher levels of lung-specific physical functioning as compared to those in the Pamphlet group. Additionally, the DVD group revealed clinically significant improvements on the physical (+19.01) and emotional (+10.74) functioning dimensions of lung-specific HRQoL; whereas, no such improvement occurred within the Pamphlet and control groups.

Results also suggested that providing patients with a Pamphlet alone was more effective than providing participants with both interventions concurrently to increase self-management self-efficacy. The simultaneous provision of both interventions did, however, enhance generic HRQoL more so than the provision of one of the two treatments alone. Finally, any type of self-management education as compared to usual care did not statistically significantly improve outcome variables among this small sample of rural patients.

DEDICATION

This dissertation is dedicated to my grandfather, Herbert Stellefson, who passed away during the completion of this project. I was so blessed to have his support and love, especially during my time in graduate school. I will always cherish the times I spent on the telephone sharing with him my experiences as a graduate student at Texas A&M, and I take great pride in knowing how proud he was of me, knowing that I was working towards attaining my doctoral degree. Through him, I learned what it truly means to work hard and persevere through difficult times. My grandfather is the most resilient man I will probably ever meet during my lifetime, and, more importantly, he was a genuinely good hearted man who we all miss dearly. The legacy my grandfather left our family will never be forgotten and I will always work to uphold the tradition of excellence he left for us to build upon.

This dissertation is also dedicated to my other grandfather, Longen Chuchman, who served as my inspiration for conducting this research. My grandfather suffers from COPD, and it was my intention to conduct a study that might help individuals like him better manage their shortness of breath. I am so pleased he was able to share in this experience with me, and I thank him so much for his valuable input which truly made my work substantially better. I hope this dissertation is a reflection of the high standard that he portrayed throughout his distinguished professional career. As he continues his courageous battle through cancer, I plan to provide him with the love and support that he has always provided me throughout my life.

ACKNOWLEDGEMENTS

I would like to first thank my doctoral committee for their guidance and support throughout the course of this research.

Dr. Ballard, thank you so much for your participation on my committee and your willingness to step in and assume the position of committee chair in the middle of my research endeavor. Thank you also for providing me the support I needed to complete this project. I will always remember and appreciate the caring nature you have for your students.

Dr. Eddy, thank you for providing me with the opportunity to attain my graduate degrees at Texas A&M University (TAMU). Without your presence at TAMU, I realize that I may never have had the professional development opportunities that I was granted throughout my degree programs. I appreciate all that you, and your wife, Sue, did for me during my time in College Station, and I thank you for seeing my dissertation project through to its completion.

Dr. J. Don Chaney, thank you for your mentorship, friendship and willingness to always support my ideas, no matter how far fetched you may have believed them to be. I think every graduate student needs an advocate in their corner, and you were always mine. I know, without reservation, that my experience as a graduate student would not have been nearly as positive without your influence on me. It was my honor and privilege to be apart of your life both professionally and personally, and I can’t thank

you enough for all that you did for me. Thanks for being such a supportive colleague, and, most of all, thanks for taking me under your wing and being such a good friend.

Dr. Lara, thank you for your willingness to serve as the outside member on my doctoral committee. Regardless of how busy your schedule got, you always found time to acknowledge my progress and provide feedback regarding the course of the project. I hope one day to be as kind and supportive as you are to your graduate students.

Dr. Beth Chaney, thank you for being the prototypical, “grade A” graduate student that I could emulate. You were my role model as a scholar. Little did I know, however, that the “scholar” Beth, while top of the line, had nothing on the “person” Beth. Your care and support of my progression as a graduate student was unparalleled, and I could not have finished my program without your participation on my doctoral committee. Thank you for being such a great teacher and friend.

This project was supported by grant #R36HS017387 from the Agency for Healthcare Research and Quality (AHRQ). The content is solely the responsibility of the authors and does not necessarily represent the official views of the AHRQ. Project support was also received through a travel grant provided by the *George Bush Presidential Library Foundation*, and educational funding was also granted through the *Will Rogers Institute Fellowship* (AAHE) and *Ruth Abernathy Presidential Scholarship* (AAHPERD). Further, the author wishes to thank Charles P. Spickert, MPH, President and CEO of RVision™ Corporation; Dr. Katherine Hensleigh, MD, Medical Director of Choctaw Urgent Care (CUC); and Ms. Wendy Ridgeway, Certified Nursing Assistant at

CUC, for their steadfast support of this project. I also want to extend my gratitude to all the COPD patients at CUC, who were willing to participate in my study.

I'd be remiss if I didn't also take this opportunity to thank my family and friends for their unwavering support of me throughout the duration of my graduate studies.

To my father, Wayne Stellefson. Dad, after all these years, I've finally achieved the goal that you and I had envisioned so long ago. There is no one on this earth who has supported me through thick and thin like you have. Your love and belief in me is something that is so special and unique, it can not be put it into words. I know how extremely blest I am to have you always in my corner. I know that my best has always been a product of the heart, desire and discipline that you instilled within me. This publication is the gift I have so longed to give you as just a small token of my gratitude for everything you have done for me, and sacrificed for our family, throughout so many years.

To my mother, Christine Stellefson. Momma, I know there is no better mother in this world that a son could wish for. You are "the best," and I am so blest to have you always support me in everything that I do. Your loving nature has made me into the person I have tried to become. As I continue on through life, I hope to become more and more like you, because I know how truly special a person you are.

To my brother, Jonathan Stellefson. Jonny, the relationship we've built over the past few years is something I'm so proud of and grateful for. Your support of me during my time in graduate school is something I'll never forget. Thanks so much for being my brother, and know I'm always there for you as well, 100% of the time.

To my grandmother, Nena Stellefson. Grandma, without your support and love, I know I would not be where I am today. I love you with all of my heart, and I can't thank you enough for showing your love for me in a way that only you can. They don't make 'em like you anymore, and I'm so lucky to have been able to learn from your example.

To my grandmother, Marian Chuchman. Grandma, we've come a long way from the swing set in the park, and hopefully we can all celebrate with the picnic we always planned for so meticulously! Thank you for everything you've been to me throughout my entire life.

To my Aunt Mary. Thank you so much for your spiritual presence in my life and for everything you've done to make my life better. You are such a special person, and I am so fortunate to have you in my life.

To the "Nature Boy," Bruce Hanik. Bruce, thanks so much for helping me analyze this data and for always being the great friend I needed here at TAMU. I'll always remember that, "the road goes on forever and the party never ends"…. And as the days go by, I know I'll see you down that road.

To the all my dear buddies from Pitt - Clint, Luke, Smitty, Mike D - thank you for sticking with me throughout my time in Texas. This document may not warrant the widespread acclaim of "The Final Synopsis," but I think it may come close. Thanks for helping me always believe.

Finally, I'd like to thank God for providing me with the strength and perseverance necessary to complete the writing and defense of this dissertation.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION TO THE PROBLEM

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease, characterized by progressive airflow limitation that is not fully reversible and is associated with an abnormal inflammatory response of the lung to noxious particles or gases (Rabe, Hurd, & Anzueto, 2007). The chronic airflow limitation characteristic of COPD is caused by a unique mixture of small airway disease (chronic bronchitis) and parenchyma destruction (emphysema), the relative contributions of which differ from person to person (Buist et al., 2007). This causes an obstruction of air leaving the lungs, and consequently, prolonged episodes of coughing (National Heart, Lung, & Blood Institute, 2007a).

Disease Pathology

In the human body, lungs provide the surface area that facilitates the bodily exchange of carbon dioxide and oxygen. When oxygen is breathed into the body, it travels down a windpipe (trachea) and then through airways known as bronchial tubes. At the ends of these bronchial tubes are balloon-like air sacs known as alveoli, which act as the venue for oxygen to pass into the bloodstream. The alveoli are surrounded by blood vessels that carry oxygen through the body and transport carbon dioxide out of the blood. In normal functioning lungs, the bronchial tubes and alveoli are elastic and allow for air to move in and out of the lungs quickly. In the lungs of those diagnosed

---

This dissertation follows the style of *Health Promotion Practice*.

with COPD, the elastic quality of the bronchial tubes and alveoli are diminished, causing the bronchial tubes to collapse and the alveoli to remain inflated. This, along with a cellular increase in sputum production, causes an obstruction of airflow out of the lungs (National Heart, Lung, & Blood Institute, 2007a).

The inflammatory response of the lung results due to exposure to respiratory irritants such as cigarette smoke. This contact is amplified by oxidative stress and an excess of proteinases (i.e., specific enzymes) in the lung. COPD patients present several systemic features, such as muscle fatigue and dynamic hyperinflation, which both have a major impact on survival, especially in patients with severe disease (Agusti, 2005; Wouters, Creutzberg, & Schols, 2002). Hyperinflation of the lungs is one of the major precursors to dyspnea (i.e., shortness of breath) and exacerbations in COPD patients (O'Donnell, Revill, & Webb, 2001). Exacerbations are defined as events in COPD characterized by change in patients' baseline dyspnea, cough, chest tightness and/or sputum that is beyond normal day-to-day variations and acute in onset (Burge & Wedzicha, 2003). Lung infections and environmental irritants cause the majority of exacerbations (Fein & Fein, 2000; Sethi, 2000; White, Gompertz, & Stockley, 2003), but the cause of about 1/3 of all other exacerbations can not be currently identified (Rabe et al., 2007). Exacerbations worsen over time with prolonged exposure to a causative agent (e. g. tobacco smoke, atmospheric pollution, occupational dust, etc.) (Zock et al., 2001). The number and nature of COPD exacerbations varies greatly from patient to patient, given that COPD is a heterogeneous disease process with respect to lung pathology (Mannino & Buist, 2007).

COPD patients who experience shortness of breath when engaging in their daily activities are more likely to disengage from activities they used to participate in, because they are fearful of experiencing exacerbations. This avoidance causes further deconditioning which can aggravate dyspnea even further (Reardon, Lareau, & ZuWallack, 2006). As the severity of COPD increases, dyspnea and fatigue begin to impact everyday life activities, especially following exacerbations. Symptoms of COPD can also include chronic cough and sputum production, both of which may or may not precede the development of airflow obstruction and dyspnea (Rabe et al., 2007).

Classification of Disease Severity

COPD progresses through different stages of decline in lung function, usually in the absence of compelling symptoms (Pauwels et al., 2001; Rabe et al., 2007). The disease is often silent and unrecognized until lung function is morbidly impaired (Rabe et al., 2007). This is usually because patients who suffer from COPD either attribute symptoms to the aging process or are unaware that bronchconstriction is present (Marks et al., 1996). In fact, only half of the estimated 24 million U.S. adults with evidence of impaired lung function have reported physician-diagnosed COPD (Mannino et al., 2002). Dyspnea, or shortness of breath, is the hallmark symptom of COPD and is a major cause of disability and anxiety associated with the disease.

Airflow limitation in COPD patients is best measured by spirometry. The spirometric classification of COPD severity includes 4 stages: stage I, mild; stage II, moderate; stage III, severe; and stage IV, very severe (Rabe et al., 2007). This classification system recommends the use of fixed ratio post-bronchodilator measures to define disease severity, which is determined by dividing forced expiratory volume in one second (FEV_1) by forced vital capacity (FVC) after patients inhale bronchodilator medications. The efficacy of this taxonomy has been supported in the literature (Agusti, 2005). However, in some epidemiologic studies, pre-bronchodilator lung function (i.e., without the use of inhaled medication) has been used to classify COPD grade (Mannino & Davis, 2006). This strategy can reportedly overestimate airflow obstruction by up to 50% (Johannessen et al., 2005; Kim et al., 2006). Although post-bronchodilator lung function is the recommended diagnostic measure of COPD severity, we do not know whether the post-bronchodilator measure is better or worse at predicting COPD morbidity and mortality (Mannino & Buist, 2007). Rather, lung function alone (Mannino et al., 2006), and in combination with body-mass index, dyspnea and exercise level (quantified as a BODE index), has been shown to accurately predict mortality in COPD patients (Celli et al., 2004). Interestingly, spiromteric measures have not been recommended for monitoring treatments for COPD (Yohannes & Hardy, 2003).

All classes of COPD patients exhibit FEV_1 / FVC ratios of < 0.70. To further classify COPD grade, patients' actual FEV_1 levels are compared against predicted FEV_1 values that are contrived based on age (especially for older adults), height, sex and race (Hardie et al., 2002; Pellegrino et al., 2005). Actual FEV_1 is divided by predicted FEV_1 to determine a percentage which quantifies the patients' actual FEV_1 in comparison to their predicted FEV_1. This percentage is then used as the marker which distinguishes disease stage. Table 1 describes the spirometric classification table adapted from Rabe and colleagues (2007) which categorizes COPD stages. This classification table does not include “restrictive” spirometry, which is characterized as an FEV_1 / FVC ratio ≥ 0.70 and an $FEV_1 < 80\%$ of the patient’s predicted value. It has been argued that this airflow limitation indicator should be apart of the classification system due to its prevalence among patients who go on to develop COPD (Kohler et al., 2003).

Table 1

Spirometric classification of COPD

Stage	Post-bronchodilator FEV_1	Symptoms
Mild (I)	Actual $FEV_1 \geq 80\%$ predicted	Chronic cough and sputum possible; patient usually unaware of abnormal lung function
Moderate (II)	50% predicted $\leq$ Actual $FEV_1 < 80\%$ predicted	Shortness of breath upon exertion; patients seek medical attention due to symptoms
Severe (III)	30% predicted $\leq$ Actual $FEV_1 < 50\%$ predicted	Greater shortness of breath; reduced exercise capacity; repeated exacerbations
Very Severe (IV)	$FEV_1 < 30\%$ predicted or $FEV_1 < 50\%$ predicted plus chronic respiratory failure	Quality of life significantly impaired; exacerbations life threatening

Source: Rabe et al., 2007

For older patients with Stage I (mild) COPD, the fixed post-bronchodilator lung function ratio is not always an accurate measure for COPD diagnosis, because the process of aging differentially affects readings of lung function. Furthermore, fixed ratio post-bronchodilator has the tendency to over diagnose COPD in older patients (Hardie et al., 2002; Rabe et al., 2007). For patients diagnosed with at least Stage II COPD, the following tests are recommended to confirm diagnosis and monitor disease status: bronchodilator reversibility testing, chest x-ray and arterial blood gas measurements (Rabe et al., 2007). Co-morbidities afflicting patients with COPD may also bias clinical diagnosis. Some experts believe that COPD and all its systemic effects (e. g. muscle wasting, heart disease, some cancers, hypertension) should come under a new umbrella term known as “chronic systemic inflammatory syndrome” (Agusti, 2005; Lopez et al., 2006).

Epidemiology

COPD prevalence, morbidity and mortality are generally directly related to the prevalence of tobacco smoking and increased age, both of which contribute to diminished lung function (Mannino & Davis, 2006). The prevalence of COPD is substantially higher among individuals who have a history of smoking, are older than 40 and male (Fukuchi et al., 2004; Halbert et al., 2006; Menezes et al., 2005). COPD is the fourth leading cause of death in the United States (following heart disease, cancer, and stroke) claiming the lives of 118,171 Americans in 2004 (National Center for Health Statistics, 2006). Morbidity measures, such as doctor visits, emergency room visits, and hospitalizations, increase with age and are greater in men than in women (Mannino et al., 2002; Soriano et al., 2000). COPD is the only major cause of death in America for which no significant decreases in morbidity or mortality have been observed in the past 20 years (Norwood, 2006).

In 2004, about 3.6 million people in the United States reported suffering from emphysema, and 9 million reported a physician diagnosis of chronic bronchitis (American Lung Association, 2007a). It has been estimated that COPD is the 7th leading cause of disability-adjusted life years (i.e., measure of the time lived with disability and the time lost due to premature mortality) in high income countries (Lopez et al., 2006). In 2005, 11.6 million Americans (aged 18 and over) were estimated to have COPD, yet there is evidence suggesting an under diagnosis of the disease (National Center for Health Statistics, 2007). Taking into account the expected aging of the U.S. population over the next 20 years and the past/current epidemic of smoking in America, it is highly unlikely that there will be any decline in the number of Americans with COPD, as the risk for COPD proliferation is substantial (Mannino & Buist, 2007; Jemal et al., 2005). By the year 2020, COPD is estimated to be the 3rd leading cause of death and the 5th leading cause of disability in the world (Feenstra et al., 2001; Lopez et al., 2006; Michaud, Murray, & Bloom, 2001; Sullivan, Ramsey, & Lee, 2000).

The World Health Organization (WHO) Global Burden of Disease Project reported that more than 2.5 million people die from COPD every year, which is about the same number as for HIV/AIDS.

In third world countries, the incidence of COPD is rising rapidly, which prompted the WHO to formally recognize COPD as a major disease threat (Pauwels et al., 2001). In nations of low and middle income, COPD was the sixth leading cause of death, accounting for 4.9% of all total deaths (Lopez et al., 2006). Results from the Burden of Lung Disease (BOLD) study revealed that South Africa, a country with an abnormally high prevalence of tuberculosis, possesses the highest prevalence of COPD as compared to 17 other countries studied (Buist et al., 2007). The BOLD study, and the Latin American Project for the Investigation of Obstructive Lung Disease (Menezes et al., 2005), both discovered that there is wide variability in COPD prevalence. This being true, mortality rates are quite similar among countries with disparate prevalence rates, which suggest there are differential diagnostic criteria affecting COPD diagnoses (Mannino & Buist, 2007). Table 2 reflects estimates of deaths and disability-adjusted life years (DALYs) due to COPD for the 25 most populous nations in the world (Lopez et al., 2006).

Table 2

World estimates of COPD deaths and disability-adjusted life years (DALYs)

Country	Age-adjusted death per 100,000 people	Age-adjusted DALYs per 100,000 people
Japan	4.4	120
France	12.0	270
Germany	12.5	291
Italy	13.7	191
Russia	16.2	242
United Kingdom	23.1	442
Iran	26.3	395
Philippines	26.7	282
Mexico	26.8	247
United States	27.2	426
Ukraine	31.6	477
Egypt	35.9	302
Turkey	40.3	521
Brazil	42.2	504
Thailand	48.0	245
Congo	49.4	297
Nigeria	49.4	296
Ethiopia	55.4	330
Myanmar	56.4	570
Indonesia	58.4	613
Bangladesh	66.4	559
Pakistan	71.1	584
India	73.2	667
Vietnam	86.4	488
China	130.5	622

Source: Lopez et al., 2006

Gender

The relationship between gender and COPD development and progression has been widely researched (de Torres et al., 2005; Mannino & Buist, 2007). Thought once to be a predominantly male disease, COPD is now rising among women, possibly due to that fact that women may be more susceptible to tobacco smoke than men (Watson et al., 2006). From 1999 to 2004, the number of women dying from COPD surpassed the number of men dying from COPD, and some reports even indicate that self-reported COPD is higher in females than among males (National Center for Health Statistics, 2006). Throughout the world, the prevalence of COPD is now almost equal across both males and females (Buist et al., 2007).

Race/Ethnicity

The prevalence of COPD among African Americans is lower than that among non-Hispanic Whites (See Table 3). The age-adjusted COPD mortality rate for African Americans was 27.3 per 100,000 in 2003, which was 40 percent less than non-Hispanic Whites (American Lung Association, 2007b). Although African Americans have lower COPD mortality and prevalence rates than Whites, they tend to have higher rates of hospitalization and emergency room visits due to COPD complications. African Americans may be highly susceptible to cigarette smoke and acquire more severe obstructive lung disease for a given degree of smoking than do susceptible non-Hispanic Whites (Chatila, Wynkoop, Vance, & Criner, 2004). In 2004, African American men had a higher rate of emphysema than African American women (National Center for Health Statistics, 2006).

Table 3

Current adult prevalence and mortality rates of COPD

	Total		Non-Hispanic White		Non-Hispanic Black		Hispanic		Non-Hispanic	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Males	59,221	51.2	52,762	54.5	3,763	42.1	1,566	26.0	57,492	52.5
Females	63,062	36.2	58,190	40.5	2,850	18.9	1,309	14.4	61,618	37.5
Totals	122,283	41.9	110,952	45.9	6,613	27.3	2,875	18.9	119,110	43.3

Sources: National Center for Health Statistics, 2006; American Lung Association, 2007b
Notes: (1) Rates are per 100,000 population and age-adjusted mortality rates are per 100,000 population.
(2) Hispanics are not mutually exclusive from Whites, African Americans, Asians/Pacific Islanders and American Indians/Alaska Natives.

Rates of COPD among Hispanics were significantly lower than in other ethnic groups. The prevalence of COPD among Hispanic Americans was far lower than among Whites (20.0 per 1,000) and African Americans (9.8 per 1,000); however, almost 700,000 Hispanic Americans (25 per 1,000 persons) were diagnosed with chronic bronchitis in 2004 (American Lung Association, 2007b). Mexican Americans who worked in office buildings, agricultural settings, construction sites and service industries were found to be 2 to 4 times more likely to develop COPD than those not working in these settings (Hnizdo et al., 2002).

There is a paucity of COPD research on Asian Americans, Native Americans/Pacific Islanders and American Indians/Alaska Natives (American Lung Association, 2007b), which lends us little evidence on the disease epidemiology among these ethnic groups. It is interesting to note that individuals of Asian decent may have a genetic component that reduces their risk of acquiring COPD regardless of their smoking habits (Barnes, 1999).

Risk Factors

Smoking is the most commonly reported risk factor for COPD development. Cigarette smokers have a higher prevalence of lung function abnormalities and a greater COPD mortality rate than do non-smokers (Rabe et al., 2007). Recent studies have shown that upwards of 50% of smokers go on to develop COPD (Mannino et al., 2006; Rennard & Vestbo, 2006). The WHO estimates that, in high income countries, 73% of COPD mortality is related to smoking (Lopez et al., 2006). Accordingly, smoking cessation has been shown to prevent further deterioration in lung function (Scanlon et al., 2000). Smoking cessation is the single most effective and cost-effective intervention to stop the progression of COPD; yet, even within best-practice programs, less than one-third of smokers achieve sustainable abstinence from smoking (Anthonisen et al., 1994; Ebrahim & Smith, 1997). Additionally, among those already diagnosed with COPD, disease symptoms persist even if smoking cessation is realized (Domagala-Kulawik, Maskey-Warzechowska, Kraszewska, & Chazan, 2003). Moreover, if every smoker in the world were to stop smoking in the immediate future, rates of COPD incidence and prevalence would most likely continue to rise for the next 20 years (Kojima et al., 2007; Lopez et al., 2006). Second hand smoke may also contribute to COPD by increasing the lungs' exposure to toxic particles and gases (Eisner et al., 2005). The evidence in support of this notion has not been overwhelming, however (U.S. Department of Health and Human Services, 2006a).

There are other lung irritants which contribute to the progression of COPD as well. Occupational dusts/chemicals, and indoor/outdoor pollution, have been identified as COPD risk factors (Behrendt, 2005; Celli, Halbert, Nordyke, & Schan, 2005), especially if these irritants contain high levels of sulphur and nitrogen oxides (Dockery & Brunekreef, 1996; Schwartz, 1995), and even among individuals who never smoked cigarettes (Hnizdo, Sullivan, Bang, & Wagner, 2002; Trupin et al., 2003). In low and middle income countries, indoor pollution from biomass cooking and heating in poorly ventilated houses is a significant risk factor for COPD development (Lopez et al., 2006; Sezer et al., 2006). Within low-income nations, exposure to indoor air pollution causes most cases of COPD. Outdoor pollution, especially in urban areas of low-income countries, may also cause COPD (Rabe et al., 2007), but it is not as pivotal a risk factor as indoor air pollutants (Lopez et al., 2006). In a similar vein, there has been evidence that risk for developing COPD is inversely related to socioeconomic status (Anto, Vermeire, Vestbo, & Sunyer, 2001); however, confounding variables such as crowding, poor nutrition, lack of access to health care and smoke exposure may be responsible for this association (Lawlor, Ebrahim, & Davey, 2004; Shohaimi et al., 2004). While the link between COPD and socioeconomic status is tenuous, the general perception of health professionals is that COPD is a disorder affecting more socio-economically disadvantaged older adults (Mannino et al., 2002).

While most patients with COPD are or have been cigarette smokers at some point in their lives, over 15% of those afflicted with the disease are non-smokers (National Center for Health Statistics, 2006). It is important to note that smoking prevalence in men has been falling since the mid 1960s, yet COPD mortality in men has been increasing since the 1970s (Mannino et al., 2002). Furthermore, not all smokers develop clinically significant COPD, which lends credence to the genetic influence on the disease (Smith & Harrison, 1997). There is a hereditary risk factor known as α (alpha)$_1$-antitrypsin deficiency (also known as familial emphysema) (Stoller & Aboussouan, 2005), which occurs mainly in northern Europeans of Caucasian descent (Blanco et al., 2006). Alpha$_1$-antitrypsin is a protein in the blood that inactivates destructive proteins. When α_1-antitrypsin is not present in the human body, the destruction of the lungs ensues, and evidence of COPD follows. Alpha$_1$-antitrypsin deficiency accounts for between 1 and 5% of COPD patients and is estimated to afflict 100,000 Americans (Alpha-1 Foundation, 2007; Stoller & Aboussouan, 2005).

Economic Costs

In 2000, about 10 million Americans were diagnosed with COPD, and the disease was responsible for 8 million general practice and outpatient visits, 1.5 million emergency room visits, and 726,000 patient hospitalizations (Mannino et al., 2002). During this time frame, total direct medical costs of COPD were estimated at $6.6 billion (Ward et al., 2000). Severe exacerbations of COPD required frequent medical attention resulting in extensive health care expenditures, estimated at $37.2 billion in 2004 alone (American Lung Association, 2007a). In 2005, medical costs related specifically to COPD were estimated at $2,700-5,900 per patient, with hospital admissions identified as the largest contributor to direct medical costs (Foster et al., 2006). In 2007, the cost of COPD in America was approximately $42.6 billion, including $26.7 billion in direct health care expenditures, $8.0 billion in indirect morbidity costs and $7.9 billion in indirect mortality costs (National Center for Health Statistics, 2007). In the European Union, the direct costs of lung disease makes up approximately 6% of their total health care budget (roughly 38.6 billion Euros), with COPD accounting for 56% of these expenditures (European Respiratory Society, 2003). From a societal perspective, COPD causes numerous inpatient and outpatient expenses.

Health care utilization among COPD patients is between two and three times greater than that of age- and sex-matched controls (Kersten, 2001; Mapel et al., 2000). The WHO projects that costs per quality-adjusted life year (i.e., adjustment taking into account quality and quantity of life lived) for COPD range from $6,700 to $238,200 depending on the course of treatment prescribed (Lopez et al., 2006). Hilleman and colleagues (2000) demonstrated that direct costs of COPD differ according to disease stage, with average costs nearly tripling from Stage I to Stage II ($1,681 to $5,037 per patient) and more than doubling from Stage II to Stage III ($5,037 to $10,812 per patient). Other studies have corroborated the nature of medical care costs skewed toward severe COPD, with the most expensive 20% of patients accounting for almost three-quarters of all direct costs (Strassels, Smith, Sullivan, & Mahajan, 2001). More than half of medical costs are caused by COPD exacerbations (Andersson et al., 2002).

Health care costs associated with COPD are expected to grow even more burdensome in the coming years (Wouters, 2003), as there is no cure for COPD. Economic modeling assumes that cost-effective treatment of declining lung function is a long-term strategy (requires upwards of 20 years to elapse). A shorter term plan aimed at limiting the quantity of exacerbations is modeled to be more lucrative (Borg et al., 2004). Accordingly, Goal 9, objective 24, of *Healthy People 2010* (U.S. Department of Health and Human Services, 2000, p. 24-20) and the Centers for Disease Control and Prevention (U.S. Department of Health and Human Services, 2006b) have addressed the need for 1) limiting health problems associated with COPD and 2) reducing the adult (age > 45) mortality caused by COPD. Despite the expected ongoing classification of COPD as a significant cause of disability and health care costs for older adults, reports indicate that COPD research is the least funded chronic disease in relation to illness burden in the United States (Gross, 2001).

Clinical Treatment and Pharmacologic Therapy

As lung function further deteriorates, pharmacologic treatments are introduced to limit the impact of this debilitating disease. Once FEV_1 falls below approximately 50% of what is predicted, the patient is at risk for severe disability and/or other morbid complications associated with declining lung function. When selecting a treatment plan for COPD, the benefits, risks, and costs (both direct and indirect) to the individual are considered (Rabe et al., 2007). Dyspnea measures and self-reports prove useful for prescribing treatments, as spirometry measures are not necessarily useful for guiding pharmacologic treatment regimens (Yohannes & Hardy, 2003). While there is not yet any convincing evidence that drugs can alter the natural course of COPD (Rabe et al., 2007), a stepwise approach to therapy can improve symptoms, activity levels and health-related quality of life (HRQoL).

The most basic clinical recommendation for COPD is that patients receive influenza and pneumococcal immunizations (Jackson et al., 2003; Sin, McAlister, Paul Man, & Anthonisen, 2003). An initial primary clinical treatment guideline suggests the use of bronchodilator drugs (e.g. inhaled anticholinergics, β_2-agonists or theophyllines) on an as needed basis for relief of persistent symptoms. Short-acting β_2-agonists and short-acting anticholinergics are commonly prescribed to patients as rescue medications for use in the home (Celli & MacNee, 2004; Rennard & Calverley, 2003). Regular treatment with long-acting bronchodilators ((e.g., β_2-agonists such as salmeterol (commercially known as Serevent) and tiotropium bromide (commercially known as Spiriva)) is more effective than treatment with short-acting equivalents (Dahl et al., 2001; Oostenbrink, Rutten-van Molken, Van Noord, & Vincken, 2004; Vincken et al., 2002; Yohannes & Hardy, 2003). There is little evidence, however, that these medications slow the decline in lung function (Anthonisen et al., 1994) and/or increase survival rates (Anthonisen et al., 2002). It is unknown whether therapy which combines the use of both long-term β_2-agonists and anticholinergics concurrently is superior to using each alone (Sin, McAlister, Paul Man, & Anthonisen, 2003). Concurrent use of salmeterol (Serevent), tiotropium bromide (Spiriva) and fluticason (a steroid which guards against bronchial inflammation) has been shown to maintain lung function, enhance quality of life, and decrease hospitalizations, but failed to reduce the number of exacerbations experienced by patients (Aaron et al., 2007). While combination therapy may produce additional benefits in terms of lung function and health status, concurrent use of multiple medications usually increases the costs of treatment (Yohannes & Hardy, 2003).

Inhaled corticosteroid therapy is a hotly contested prescription for COPD patients (Barnes, 2000; Calverley, 2000) and is considered the next primary step in pharmacological treatment. For patients with stage III or IV COPD, the reduction of exacerbations is the main justification for introduction of inhaled corticosteroids, such as prednisolone. Its use, combined with long-acting β_2-agonists, has been shown to slow down declines in disease specific HRQoL (Sin, McAlister, Paul Man, & Anthonisen, 2003). Critics of this treatment have argued that glucosteroids should be avoided due to an unfavorable risk-to-benefit ratio (Decramer, Lacquet, Fagard, & Rogiers, 1994; Wood-Baker, Walters, & Haydn Walters, 2006; Yohannes & Hardy, 2003).

For patients with severe COPD (stage IV), the final step in pharmacological treatment is long-term oxygen therapy. This treatment has increased survival rates of patients with severe COPD (Tarpy & Celli, 1995). The goal of oxygen therapy is to maintain partial pressure of oxygen in arterial blood (SaO_2) greater than or equal to 90% at rest. It is important to note that patients with less severe COPD show no improvement in survival after being treated with oxygen therapy (Chaouat et al., 1999; Gorecka et al., 1997). The proper, prescribed use of pharmacologic therapy, in general, results in lower healthcare costs for COPD patients (Friedman & Hilleman, 2001), especially for those with advanced stages (III & IV) of the disease (Miller, George, & Halbert, 2005).

Surgery may also be beneficial in patients with certain types of emphysema. Lung volume reduction surgery is particularly effective for people with heterogeneous emphysema, hyperinflation and poor exercise capacity (Naunheim et al., 2006). Another type of surgery, known as a bullectomy, is also effective at reducing dyspnea and improving lung function (Mehran & Deslauriers, 1995). In addition, lung transplantation is an option for patients with very advanced COPD whose projected survival is less than 2 to 3 years (Arcasoy & Kotloff, 1999). It should be noted that these surgical procedures are extremely expensive, have not been shown to improve mortality, and can only be recommended in very select patients who suffer from stage IV COPD (Rabe et al., 2007). Even if surgery is performed, the potential for patients to suffer from complications after surgery is great, which makes surgery an option that is not often recommended.

Disease Management

COPD patients are faced with multiple health responsibilities, such as preventing and managing COPD exacerbations and handling prescribed medications. COPD is a progressive disease and lung function is expected to deteriorate over time. Accordingly, symptoms need to be monitored to inform therapeutic regimens and identify pending complications. It has been suggested that healthcare professionals focus attention on the care processes for managing and preventing complications that arise due to COPD (Miller, George, & Halbert, 2005). Disease management is an approach which coordinates resources across the health care system with the aim of fostering continuity of care and increased patient knowledge and control over disease (Hunter & Fairfield, 1997). The idea of COPD management has received much attention. World COPD Day is held annually on the third Wednesday in November to raise awareness about COPD management and advocate for a comprehensive care system which has the capacity to direct the optimal management of COPD (Rabe et al., 2007).

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) in partnership with the WHO's Global Alliance Against Chronic Respiratory Diseases (GARD) initiated a worldwide collaborative effort which teamed healthcare personnel with policymakers in order to develop an expanded COPD research agenda dedicated to improving the management of COPD. One of the major projects involved the development of a comprehensive report entitled, *Global Strategy for the Diagnosis, Management, and Prevention of COPD* (Rabe et al., 2007). This reports describes evidence-based research on best practices associated with COPD management. The management of COPD is separated into four components: (1) assess and monitor disease, (2) reduce risk factors, (3) manage stable COPD, and (4) manage exacerbations. The overall goals of COPD management are listed in Table 4. It has become clear that improvements in the management of COPD will result as a function of well-designed behavioral-oriented interventions (van der Palen, Monninkhof, & van der Valk, 2004).

Table 4

Goals of COPD management

Primary goals of COPD Management
▪ Relieve symptoms
▪ Prevent disease progression
▪ Improve exercise tolerance
▪ Improve health status
▪ Prevent and treat complications
▪ Prevent and treat exacerbations
▪ Reduce mortality

Source: Rabe et al., 2007

Using these four component parts as a framework, empirical models have been developed (cf. Adams et al., 2007; Endicott et al., 2003) and evaluated (Adams et al., 2007) to determine how to best structure, implement and evaluate COPD management programs. Studies have shown that integrating at least 2 of the aforementioned management components into programs results in less health care utilization (Adams et al., 2007). Both secondary and tertiary prevention strategies exist for COPD (Mannino & Buist, 2007). Modifying exposure to risk factors (secondary) and prevention of complications associated with COPD progression (tertiary) are strategies used to manage COPD (Bednarek et al., 2006; Celli et al., 2006; Croxton & Bailey, 2006). As with treatment, COPD prevention should be individualized to address specific symptoms and

HRQoL concerns (Rabe et al., 2007). The implementation of prevention strategies within the course of disease management ought to be assimilated into health services comprehensively, with careful attention to placed on the cost-effective prevention of exacerbations and disease-related complications (Lopez et al., 2006; Wagner, 2004). Improving quality of care through disease management can include the distribution of simple, easy to follow management guidelines through multiple communication channels (Miller, George, & Halbert, 2005).

Pulmonary Rehabilitation

Pulmonary rehabilitation is a structured (usually hospital run) program of supervised and monitored physical activity, breathing therapy, behavioral management and modification (e.g., smoking cessation), nutrition counseling and disease education that has been shown to improve quality of care for COPD patients. The goals of pulmonary rehabilitation are to reduce symptoms, increase participation in daily activities, and reduce the impact of disease-related complications and exacerbations on HRQoL (Rabe et al., 2007). To achieve these goals, pulmonary rehabilitation programs are generally offered to patients with advanced COPD (Stages II – IV), as these patients are more prone to exercise deconditioning, social isolation, depression, muscle wasting and weight loss.

Most pulmonary rehabilitation programs are sponsored by pulmonologists. Before beginning a pulmonary rehabilitation program, patients normally undergo a battery of baseline assessments in order to target areas for improvement, and provide comparative measures for impact and outcome evaluations. Baseline assessments traditionally entail spirometry measures (before and after use of a bronchodilator), exercise capacity assessments, and measurements of HRQoL and dyspnea (Rabe et al., 2007). The time span of most programs lasts approximately 20-30 sessions, with optional maintenance sessions offered following completion of the primary program. Program participants attend rehabilitation sessions approximately 3-4 times per week for about one hour each session.

After a warm up period of approximately 5-10 minutes, therapists and nurses direct participants through exercise training circuits on weight resistance machines, treadmills and stationary bicycles for a period of 45-50 minutes. While participants move from machine to machine, trained medical professionals monitor and record the blood pressure and pulse oximetry of patients to ensure that levels remain within an acceptable range throughout the duration of the training session. Patients are encouraged to work towards intensity levels commensurate with their self-imposed level of achievement. Most aerobic training is targeted at 60% to 90% of the predicted maximal heart rate for a period of approximately 30 minutes (American Thoracic Society, 1999). In addition to these exercise sessions, there are approximately 3-5 educational sessions offered to patients (lasting approximately 30-45 minutes each) during the program cycle. These sessions cover topics such as normal and abnormal lung function, stress management, medication adherence, and dietary considerations.

To evaluate the impact of pulmonary rehabilitation programs, outcome data from the rehabilitation sessions (e. g. pulse oximetry, blood pressure measures, weight resistance machine settings, elapsed time of exercise, perceived level of difficulty, measurements of HRQoL and dyspnea) are compared to baseline data collected before the program's inception. This information is shared with the patient's pulmonologist and primary care physician to update patient progress. Impact evaluations of pulmonary rehabilitation programs demonstrate improved functional performance, exercise tolerance, HRQoL and dyspnea levels among COPD patients (Nici, Donner, Wouters, & Zuwallack, 2006; Rabe et al., 2007; Yohannes & Hardy, 2003). However, these improvements are occasionally only visible when patients continually participate in programs or recently complete a rehabilitation cycle. This contributes to findings which indicate that pulmonary rehabilitation does not improve hospitalization rates (Griffiths et al., 2001).

The first enrollment in pulmonary rehabilitation is normally covered by Medicare for patients who qualify; however, patients who wish to continue rehabilitation after the first round of therapy must usually pay for it out of pocket. This type of maintenance program can prove to be quite costly for patients, especially those with limited monetary resources. Therefore, attempts at COPD self-management in the home environment, with no requirements for specialized facilities or group meetings, have been encouraged (Gravil et al., 1998).

COPD Self-Management

Because of limited access to hospital-based pulmonary rehabilitation for underserved patients, practical *self-management* programs have been implemented to improve the overall management of COPD. COPD self-management refers to: engaging in activities that promote adequate inhalation technique, build physiologic reserves, and prevent adverse health outcomes; interacting with healthcare providers and complying with recommended treatment protocols; monitoring respiratory and emotional status and making appropriate management decisions on the basis of this self-monitoring; and managing the effects of illness on self esteem and coping skills (Von Korff et al., 1997). Chronic disease self-management programs promote active patient participation and focus on acquisition and implementation of learned skills and enhancing patient self-confidence related to disease management decision making (Bourbeau & Nault, 2007). In recent systematic reviews of the efficacy of COPD self-management education programs, an association was established between self-management education and improved HRQoL, with no indication of detrimental effects on other related health outcomes (Effing et al., 2007).

In light of the effectiveness of some COPD self-management programs, health educators have been encouraged to develop and test cost-effective, readily accessible interventions which (1) define the true effective educational elements of COPD self-management and (2) facilitate the acquisition of self-management skills. There are still many unanswered questions which need to be addressed with respect to COPD self-management education and skill acquisition, however. Previous work indicates that adults use a variety of strategies to adapt to chronic disability (Falter, Gignac, Brooks, & Cott, 2002), each of which may impact health and HRQoL in unique and disparate ways, often in a reciprocal fashion. Moreover, understanding self-management behaviors is complex and represents a “black box” for health care professionals (Cicutto, Brooks, & Henderson, 2004).

Health Related Quality of Life (HRQoL)

COPD has a major effect on HRQoL (Ferrer et al., 1997; McDowell & Newell, 1996; Yohannes, 2005). HRQoL has been defined as the physical, psychological, and social domains of health that are unique to each individual (Testa & Simonson, 1996). This construct is measured in various ways to describe physical and social functioning and general health perceptions (Ware, 1995). HRQoL is an important marker for measuring 1) the impact of chronic disease (Patrick & Erickson, 1993), 2) the effect of interventions designed to treat chronic disease (Wennberg, 1990), and 3) intervention cost-effectiveness (Kaplan & Ries, 2005). Patient interpretations of chronic conditions and adaptations to disease-associated problems must be taken into account when assessing HRQoL (Kaplan & Ries, 2005). Assessments of HRQoL can quantify the impact of disease on everyday life activities (functional status) and well-being (Reardon, Lareau, & ZuWallack, 2006), as HRQoL has been shown to be a strong predictor of COPD exacerbation frequency (Wilson et al., 1997). Over time, lung function improves after an exacerbation episode, yet HRQoL remains relatively stable following an exacerbation which requires hospitalization (Andenaes, Moum, Kalfoss, & Wahl, 2006).

There has been an increased interest in examining HRQoL among patients with COPD, due to practitioner and patient concern about symptoms and functionality more so than objective lung function (Mahler, 2000). Objective measures of lung function may not accurately predict disability (Pitta et al., 2005) and/or even be related to HRQoL (Arnold et al., 2005; Killian, Summer, Jones, & Campbell, 1992; Hesselink et al., 2006; Jones, 2001; van Schayck et al., 1992; Williams, 1989). Furthermore, HRQoL and pulmonary function may highlight different aspects of COPD and provide complementary information about disease severity (Hesselink et al., 2006). This is not necessarily surprising considering that improvements in symptoms, “cannot be inferred reliably from spirometric changes” (Jones, 2001, pp. 885).

There are two main approaches to assessing HRQoL: psychometric and decision theory (Kaplan & Ries, 2005). The psychometric approach provides a profile of the different domains related to HRQoL (but does not classify domain relevance and importance), while decision theory weights the different dimensions of health to provide a single HRQoL index (Kaplan & Ries, 2005). Questionnaires are developed using items that reflect various domains or dimensions which discriminate experiences and behaviors that impact HRQoL (Guyatt, Feeny, & Patrick, 1993). Measures can be generic (to measure general HRQoL) or disease specific (to measure aspects of HRQoL which are only specific to patients with a unique condition). Specific HRQoL measures have been suggested for distinct health conditions, because there is greater potential for more responsiveness when only relevant aspects of HRQoL are included for assessment (Guyatt et al., 1993).

In addition, minimal clinically meaningful differences have been established for a variety of disease specific HRQoL instruments (Jones, 2001). There is no single gold standard for the measurement of HRQoL, so investigators are encouraged to select responsive instruments which meet research goals in a practical manner (Puhan et al., 2007). As noted by Mahler (2000), “the responsiveness of an evaluative instrument is essential to evaluate the impact/benefit of a specific intervention on the outcome of health status" (pp. 55S). Furthermore, assessing HRQoL in patients with COPD has become a major goal of disease management (Monninkhof et al., 2004a).

Information Needs

It is known, however, that targeted health education plays a vital role in improving skills, coping ability and HRQoL among patients with COPD (Celli, 1995; Gallefoss, 2004; Mannino & Buist, 2007). Targeted patient education may not improve exercise tolerance or lung function specifically, but it can have a dramatic impact on patients' ability to deal with disability caused by COPD. Programs which teach self-management skills and provide comprehensive educational services to patients reveal better outcomes than programs which simply use follow-up appointments to monitor disease status (Sin et al., 2003). Consequently, Gulsivik and colleagues (2006) stress that educational messages should be made prominent within all COPD home-care and outreach activity. Likewise, Rabe and colleagues (2007) argued that, "Education should be [directed at] the needs…of the patient, interactive, directed at improving quality of life, simple to follow, practical and appropriate to the intellectual and social skills of the patients" (p. 541). Patients' educational level, cultural outlook, socioeconomic status and willingness to apply disease management education are all important individual-level factors which vary amongst specific priority populations. This is just one of many important considerations (e.g., external factors such as environment, social circumstances, etc.) when developing educational messages and programs. Topics relevant for disease management education include dyspnea management techniques, decision making during exacerbations, and advice on when to seek medical attention.

As COPD progresses, it becomes more complex and spirals into an abstract complex of interrelated physical, emotional and psychosocial problems. Patients are in a constant process of learning as they endure, manage and adapt to the changing nature of the disease. They must learn to cope not only with the physical symptoms of COPD, but also with the psychological and social problems caused by COPD pathology. Psychological co-morbidity, especially anxiety and depression, is seen frequently among patients with COPD (Cleland, Lee, & Hall, 2007; Stage, Middelboe, & Pisinger, 2003). Depression is aggravated by worsening dyspnea and perceived poor health, both of which contribute to diminished functional capacity (Yeh, Chen, Liao, & Liao, 2004). The prevalence of depression and anxiety in patients with COPD has been estimated at upwards of 80% (Kunik et al., 2005). Younger (< 60 years of age) patients report higher levels of depression and anxiety (Cleland, Lee, & Hall, 2007); yet currently, less than 1/3 of COPD patients receive treatment for their depressive and/or anxiety-related symptoms (Kunik et al., 2005). Furthermore, COPD patients who are depressed have difficulty learning and implementing treatment plans which limit exacerbations (Dowson, Town, Frampton, & Mulder, 2004). Research has shown, however, that willing participants of dyspnea self-management programs significantly improve depressive symptoms (Nguyen & Carrieri-Kohlman, 2005). Accordingly, educational methods must be readily adjusted to suit the self-management learning needs and disease status of individual patients (Bourbeau, 2003).

Patient-centered education developed in accordance with patients' specific needs is a key factor in managing COPD (Neish & Hopp, 1988; O'Donnell et al., 2004;

Redman, 2004). There are two ways of assessing patients' learning needs in regards to COPD: (1) knowledge and (2) information needs (Bourbeau, Nault, & Dang-Tan, 2004; Steward et al., 2001; White et al., 2006). Patients differ in terms of the depth and type of information that they seek (Dowson et al., 2004), so guidelines recommend that educational development take into account differing needs of patients (National Collaborating Centre for Chronic Conditions, 2004). Information needs assessments attempt to ascertain the opinions of learners regarding what information *they* want to learn, what educational topics *they* believe are important and which self-management topics *need* to be addressed (Murray, Boyd, & Sheikh, 2005).

Research has shown that evidenced-based COPD self-management involves appropriate prescription of education to patients who are able to make use of prescribed information. An array of instructional materials can be provided to patients regarding a variety of self-management skills such as: the use of respiratory therapy equipment, proper breathing techniques, bronchial drainage and physical activity (Redman, 2004). Developing innovative educational materials which promote self-management *behaviors* is the only way self-management *education* can have a long term impact on patients with COPD. As a result, constructs such as self-efficacy are important to measure both before and after program implementation (Effing et al., 2007).

Self-Efficacy

Self-efficacy is a person's belief in their capabilities to carry out a particular action or behavior which fulfills a task that produces a desired result. Personal efficacy beliefs can influence an individual's motivation, course of action, resolution, cognitive thoughts, emotional response and attribution of accomplishment and failure (Bandura, 1978). Efficacy beliefs are powerful predictors of behavioral adherence to prescribed management strategies (Eakin, 1992) and vice-versa (Bandura, 1978). It has been argued that the effects of a self-management education program on HRQoL results from behavior change that is caused by enhanced self-efficacy, skill building and a reduced need for self-management information. To facilitate enhanced self-efficacy, it is suggested that instructional processes take into account four sources of efficacy information: (1) performance mastery, (2) vicarious experience or modeling, (3) emotional or physiological arousal, and (4) verbal persuasion (Bandura, 1997), all of which help contribute to efficacy beliefs for specific tasks.

Statement of the Problem

Despite the efficacy of hospital-run pulmonary rehabilitation programs which assist patients in medically managing COPD (Griffiths et al., 2000; Lacasse, Goldstein, Lasserson, & Martin, 2002), the high costs and lack of availability of such programs pose considerable barriers for underserved COPD patients looking to maintain and improve HRQoL. Due to the scarce availability and high expense of hospital-run pulmonary rehabilitation programs, primary care physicians generally encourage patients to actively self-manage COPD. Given time constraints, the majority of primary care physicians are unable to provide sufficient “in-person” education to patients regarding COPD self-management. In addition, some physicians do not feel prepared to teach patients within the clinical environment due to the low priority that patient education is given by managed care administrators. The absence of third-party reimbursement to support patient education makes teaching and learning between provider and patient quite difficult to achieve. This is problematic, because patients report not having their disease-related concerns addressed during routine consultations (Tate et al., 1999). Because of this, some COPD patients do not feel connected to their health care providers. This feeling of disconnect affects patients' decision making regarding disease management (Leidy & Haase, 1996). COPD patients prefer to be involved in their own medical decision making and respond better if they are included in the process (Bourbeau, Nault, & Dang-Tan, 2004; Worth & Dhein, 2004).

There are considerable unmet educational needs for patients looking to manage COPD effectively (Elkington & White, 2002). COPD patients report widespread dissatisfaction with the self-management education they are provided (Barr et al., 2005; Gore, Brophy, & Greenstoe, 2000; Jones, Hyland, Hanney, & Erwin, 2004). Most notably, there seems to be a paucity of patient-centered interventions that take into account patients' perspectives and knowledge of disease management by way of a needs assessment (Woo et al., 2006). This is disappointing, given that approaches to community-based, chronic disease self-management are purported to focus on enabling additive guidance which will achieve self-management goals (Bandura, 2004). In order to adequately self-manage COPD, patients must not only be educated in appropriate COPD self-management skills, but they must also confident that they can employ the knowledge and skills learned (Boot et al., 2005; Brooks, Lacasse, & Goldstein, 1999).

Moreover, the limited information patients receive during short interactions with their primary care physician does not correspond with their learning needs for COPD self-management (Elkington & White, 2002; Suhonen, Nenonen, Laukka, & Valimaki, 2005). There are various skills to develop and barriers to overcome before COPD self-management can be applied in everyday life (Suhonen, Nenonen, Laukka, & Valimaki, 2005). Rehabilitative behaviors such as: breathing retraining, medication management, energy conservation, relaxation, visual imagery and paced walking have all been noted to be suboptimal among COPD patients, largely due to patients' lack of self-management education (Cicutto & Brooks, 2006). Thus, it is important to identify effective educational strategies for enhancing self-efficacy among COPD patients who need to manage their disease.

Few investigations have examined the relationship between COPD disease self-management and patient self-efficacy in making behavioral modifications, but those which have revealed promising results. Self-efficacy has been shown to be a predictor of participation in COPD self-management activity (Gormley, Carrieri-Kohlman, Douglas, & Stulbarg, 1993; Kaplan, Ries, Prewitt, & Eakin, 1994), and interventions which provided information to patients regarding COPD self-management increased patients' self-efficacy for managing COPD in some studies (Scherer & Schmieder, 1997; Tsang, 2000; Zimmerman, Brown, & Bowman, 1996), but not all (Scherer, Schmieder, & Shimmel, 1998). Atkins and colleagues (1984) showed that COPD patients exhibited statistically significant improvements in self-efficacy judgments when exposed to cognitive and behavioral modification strategies. From these initial studies, however, it is unclear as to what type of educational treatment optimally increases feelings of self-efficacy regarding COPD self-management. A better understanding of the actual nature of the educational treatment delivered and its ability to reduce information needs, increase perceived efficacy towards self-management, and enhance HRQoL is important to understand, and should be the focus of future research (van der Palen et al., 2004).

Older adults suffering from COPD have unique preferences for the manner in which they obtain self-management education (Carlson et al., 2006; Van Wynen, 2001). It has been suggested that older COPD patients appreciate and learn well from home-based educational programs which use audiovisual media to transmit targeted self-management instruction (Boxall, Hons, Sayers, & Caplan, 2006; Constantinidou & Baker, 2002; Finklestein & Ratner, 2006; Nguyen et al., 2003; Petty et al., 2006). Interventions designed to provide mastery experiences for COPD self-management can increase a patient’s efficacy beliefs for accomplishing self-management behaviors (Tsang, 2000). In light of this, translational research should focus on disseminating innovative educational material which can utilize readily available technology to provide underserved COPD patients with customized educational resources that can (a) satisfy informational needs regarding COPD self-management, (b) enhance self-efficacy regarding COPD self-management, and thereby (c) positively impact HRQoL. Figure 1 provides a conceptual model of this idea. The DVD modality is optimal for segmenting and illustrating educational information according to different skills and behaviors necessary for self-managing COPD.

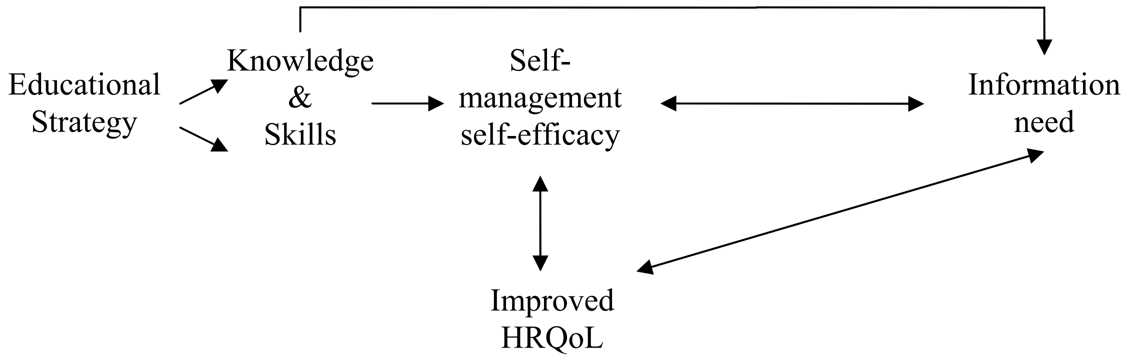


Figure 1. Conceptual model of research study
Adapted from: Bourbeau & Nault, 2007

The effect of peer modeling for COPD patients may be an important area for further research endeavors (Davis et al., 2006). Do patients need exposure to audio-visual directives, which show individuals how to engage in COPD specific self-management activities? Are directives relayed through traditional text formats instructive enough? Is it more effective to couple the use of audio-visual directives with text-based guidelines? Some of these questions have been answered to a limited degree, but more research questions need to be developed and tested to explore answers related to these important questions.

Purpose

Primary Aim

The primary aim of the present study was to measure and specifically compare the effect of three COPD self-management education dissemination strategies (and a control strategy) on relative differences in generic and disease-specific HRQoL, COPD information needs and COPD self-management self-efficacy. The four educational treatments were:

1. Targeted RVision™ DVD segments (RVision™ Corporation, 2007)
2. Pre-produced written Pamphlet, *Breathing Better With a COPD Diagnosis* (National Heart, Lung and Blood Institute (NHLBI), 2007b)
3. Targeted RVision™ DVD segments and *Breathing Better With a COPD Diagnosis*
4. Usual care (control)

Secondary Aim

The secondary aim of the present study was to assess the self-management learning needs, experiences and perspectives of COPD patients who were treated at Choctaw Urgent Care, a Certified Federal Rural Health Clinic in rural Butler, Alabama. This was undertaken to inform the development of the targeted intervention materials.

Hypotheses

Secondary Aim

Hypothesis # 1: Patients will identify experiences underlying the major theme of surviving life with COPD, with two sub themes being adjusting physically and emotionally (Cicutto et al., 2004).

Hypothesis #2: Patients will discuss the balance between living life and managing disease, with practicing breathing exercises and medication management emerging as the two most effective and readily accepted disease management activities (Cicutto et al., 2004).

Primary Aim

Hypothesis # 3: Patients exposed to targeted DVD segments (Treatment 1) will outperform patients exposed to the educational Pamphlet (Treatment 2) on outcome variables related to COPD Informational Needs, COPD Self-Management Self-Efficacy, and HRQoL (Boxall, Hons, Sayers, & Caplan, 2006; Constantinidou & Baker, 2002; Finklestein & Ratner, 2006; Nguyen et al., 2003; Petty et al., 2006).

Hypothesis # 4: Patients exposed to the targeted DVD and educational Pamphlet (Treatment 3) concurrently will underperform as compared to patients exposed to the DVD (Treatment 1) and educational Pamphlet alone (Treatment 2), on outcome variables related to COPD Informational Needs, COPD Self-Management Self-Efficacy, and HRQoL (Consumer Information Processing Theory (CIPT); Rudd & Glanz, 1990).

Hypothesis # 5: Patients exposed to targeted DVD segments (Treatment 1), educational Pamphlets (Treatment 2), and both DVD segments and educational Pamphlets concurrently (Treatment 3) will outperform patients exposed to the usual care (control) condition (Treatment 4) on outcome variables related to COPD Informational Needs, COPD Self-Management Self-Efficacy, and HRQoL (Self-efficacy Theory; Bandura, 1997; Effing et al., 2007).

Delimitations

This study was delimited to a diverse population of male and female adults over the age of 50, who suffered from varying stages of COPD and whom which were patients of Choctaw Urgent Care in Butler, Alabama. The investigation was limited to testing the effects of different educational intervention strategies on health related outcomes in a rural population of older adults. The health-related outcome measures were delimited to the ones identified above. Participants were required to comprehend English, and were not allowed to have a roommate, housemate or family members also participating in the study. This was done to reduce contamination and diffusion effects, are both threats to internal validity.

Assumptions

The following assumptions were made:

1. The educational treatments were viewed and reviewed as prescribed before the posttest measurement.
2. The patients self reported measures of HRQoL, COPD Informational Needs, and COPD Self-Management Self-Efficacy were honest and accurate.

Operational Definitions

Self-Management

Self-management is defined as any formalized patient education program aimed at teaching skills needed to carry out medical regimens specific to a disease, guide health behavior change and provide emotional support for patients to control their disease and live functional lives (Bourbeau, 2003)

Self-Management Education

Self-management education is defined as a program which transfers information about COPD and treatment of COPD in either written, verbal, visual or audio formats (Effing, 2007).

COPD Self-Management Self-Efficacy

COPD self-management self-efficacy is defined as a patient's confidence in their ability to carry out a variety of skills necessary to effectively self-manage COPD

COPD Information Need

COPD information need is defined as the level of self-perceived need for information related to the self-management of COPD

Health Related Quality of Life (HRQoL)

HRQoL is defined as the physical, psychological, and social domains of health that are unique to each individual (Testa & Simonson, 1996). This construct measured in general and disease-specific ways to describe physical and social functioning and general health perceptions (Ware, 1995).

CHAPTER II

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The term *self-management* has become commonplace in health education and health promotion circles, and it is attached to numerous patient education programs (Lorig & Holman, 2003). Creer, Renne, and Christian (1976) first coined the term in the mid-1960s, and described it as patients being active in the treatment of their own chronic illness. Self-management has more recently been defined as any formalized patient education program aimed at teaching skills necessary to carry out medical regimens specific to a disease, guide health behavior change and provide emotional support for patients to control their disease and live functional lives (Bourbeau, 2003). Chronic disease self-management is especially important for chronically ill patients who act as the sole provider of their personal daily care (Lorig & Holman, 2003). Due to rising health care costs stemming from increased use of chronic disease health services, there is growing pressure placed on health systems to find strategies which limit, ration and delay health service utilization among populations who suffer from chronic disease. Effective chronic disease self-management is one such strategy. In fact, Bandura (2004) stated that, “if the huge health benefits of these few health habits (chronic disease self-management) were put into a pill, it would be declared a scientific milestone in the field of medicine” (pp. 143).

Self-management programming fulfills the demand for health programs that limit complications caused by chronic disease. The emergence of these types of programs is reflective of the growing shift from the medical management model, which emphasizes compliance with prescriptive regimens, to a more collaborative self-management model of health and health care (Maes & Karoly, 2005). Figure 2 illustrates how programs are delivered using this model. The self-management model emphasizes mastery of self-regulatory skills such as: self-monitoring health-related behavior and its socio-cognitive precepts; setting goals to guide management strategies and routines; and procuring incentives and social support to help sustain healthy action (Bandura, 2003). This revisionist approach uses a process model which focuses on how psychosocial means affect health.

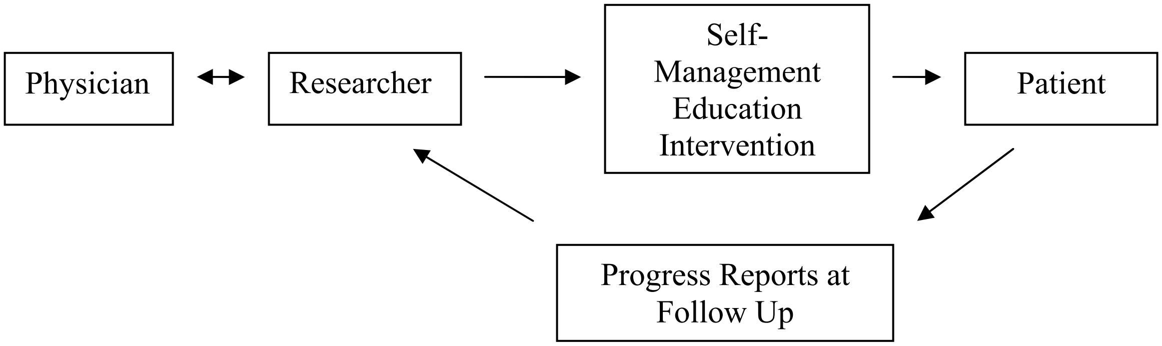


Figure 2. Self-management model for program delivery
Adapted from: Debusk, Miller, & Superko, 1994

Five core self-management skills have been identified in the literature: (a) problem solving, (b) decision making, (c) resource utilization, (d) forming partnerships between patients and health care providers, and (e) taking action (D'Zurilla, 1986). Problem solving involves defining disease-related problems, exploring solutions to problems from multiple sources, implementing only sound solutions, and evaluating the results of solution(s) implementation. Thus, the self-management of COPD is multi-faceted in nature. Decision making refers to contemplating the daily choices which arise based on the changing pathology of chronic disease. For adequate decision making to take place, patients must have enough and appropriate information from suitable resources (Lorig & Holman, 2003). The practitioner develops key messages which encourage proper decision making, while making use of resources provided to the patient. Utilizing suitable resources requires that patients are able to navigate through all possible sources of health information and hone in on information that is most important for their own, personal needs. Health professionals are tasked with teaching patients to (a) make informed decisions about treatment, (b) report the trends and tempo of their disease, and (c) discuss disease-related experiences with health care providers (Lorig & Holman, 2003). To be effective, self-management education must be developed in accordance with a mutually understood care plan agreed upon between the patient and provider (Bourbeau & Nault, 2007).

A self-management skill often ignored is the ability to take action and apply self-management skills and knowledge to one's own self (Lorig & Holman, 2003). While studies have shown that self-management education interventions improve patients' knowledge level regarding disease, improved knowledge has seldom been associated with improved HRQoL and reduced health service utilization. Mazzuca (1982) showed that efforts to improve health by improving knowledge alone were rarely successful, while behaviorally-oriented programs which outlined specific patient education regimens were more effective in limiting the progression of chronic disease. Simply put, patients may need to know less about the pathophysiology of their disease and more about how to assimilate self-management behaviors into their daily lifestyles. Health educators are directed to target information in a self-management education program towards patients' particular risk factors, so that patients master self-management tasks which are truly important.

Due to the importance of self-regulatory action within the self-management model, self-management programs strive to keep the patient keenly involved in efforts aimed at achieving and maintaining wellness, not merely treating bouts of illness. The treatment of chronic disease focuses on self-management of both physical and emotional conditions over time (Bandura, 2004). Effective health promotion programs geared towards disease self-management include four main components: (a) provision of information, (b) translating information into preventive action, (c) self-efficacy building, and (d) creating support for desired health behavior change. Health promotion programs that include these components can reduce and prevent deleterious health habits (Bandura, 2004). The provision of self-management education can facilitate the first 3 of these 4 components and assist in cultivating support for potential long-term behavioral modification.

Best Practices for COPD Self-Management

Integrating chronic disease self-management programs into our pre-existing health care system is a daunting, but not impossible task. Three recommendations for integration are: (a) preparing the system, (b) preparing patients, and (c) developing payment mechanisms. Self-management education is best initially conducted in conjunction with a clinical setting, because this type of collaboration fosters an ongoing patient-provider relationship (Lorig & Holman, 2003). This accommodation proves difficult, however, given that few health education practitioners exist within the infrastructure of current clinical care settings and systems. Even if health educators do exist to provide self-management education services, they are sometimes viewed as subsidiaries not central to the treatment of patients. This auxiliary view of health education is further exposed when resources are not allocated to evaluate the impact of self-management education provided to patients. When health education becomes unregulated, quality control efforts are nearly impossible, and self-management education disintegrates from within clinical care protocols.

Lorig and Holman (2003) discuss several solutions which can overcome barriers to self-management education program implementation in the clinical setting. First, ideal populations should be identified through a systematic needs assessment. Second, evidence-based programs must be sought out and implemented according to practice-based guidelines. Next, qualified personnel must be put in place to maintain program fidelity and implement and evaluate the program. Lastly, the program itself must be assimilated into other mainstays of health care service, such as pharmacy and laboratory services (Lorig & Holman, 2003).

Bourbeau and Nault (2007) suggest that the development of patient centered self-management education programs requires four main planning requirements. Health educators should ensure that: (a) interactions between the learners and educators will occur; (b) education is based on the learning styles and needs of patients and provided in a format highly conducive to behavioral response; (c) mastery of self-management skills is placed at a premium; and (d) evaluation of patient outcomes is completed. It is important to understand what patients know about their disease, what their concerns or problems are related to the disease, and which coping skills they are currently using to live with the disease (Weston-Eborn & Sitzman, 2005). Educational topics of interest to the patients must be integrated into instructional sessions, and these sessions should be weaved into an educational process that supports the natural diffusion of pertinent information. The practitioner is encouraged to use a variety of educational methods to disseminate information, as multiple methods are more likely to ensure information retention (Nault et al., 2002). Table 5 lists efficient self-management educational methods used to instruct individuals with COPD.

Table 5

Efficient COPD self-management education methods

Educational Methods
▪ Interactive lecturing
▪ Motivational interviewing
▪ Going through case scenarios and determining how to handle specific disease-related situations
▪ Demonstrations and practice of self-management techniques
▪ Constructive feedback and reinforcement
▪ Learning contract which specify goals for self-management
▪ Distribute population-specific written material to improve health literacy

Adapted from: Bourbeau & Nault, 2007

In regards to content within COPD self-management education programs, topics worth addressing include: proper use of prescription medication, breathing control, energy conservation, recognition and treatment of exacerbations, stress management and disease-adapted physical activity. These are just a few of the variety of behaviors which are encouraged for COPD self-management. Behavioral adaptations for COPD patients require the mastery of specific skills (See Table 6 for Health behaviors and skill sets in COPD self-management).

Table 6

Health behaviors and skill sets in COPD self-management

Self-management behaviors (in **bold**) and requisite skill sets (in *italics*)
Live in a lung irritant-free environment
-Quit smoking
-Avoid second-hand smoke
Manage medications
-Take medications as prescribed and with proper technique
Manage breathing
-Purse-lip breathing
-Postural positioning
-Controlled coughing
Energy conservation
-Plan your daily activities
-Prioritize most important activities first
-Pace yourself while carrying out activities of daily living
Stress management
-Relaxation and imagery techniques
-Maintain positive outlook
-Problem solving
Exacerbation management
-Get influenza vaccinations every year
-Know when to call the doctor
-Avoid activities and situations that make you feel worse
Active living
-Maintain walking, stair climbing, and other physical activity using purse-lip breathing
-Choose activities that you enjoy and do them
-Pace yourself
-Know your limits
-Be active in environments that will not aggravate symptoms
Healthy eating
-Eat smaller meals more often (5-6 per day)
-Eat foods high in protein

Source: Bourbeau & Nault, 2007

Patient Perspectives

When developing self-management programs, it is advisable that practitioners recognize the dissimilar concerns that are brought to light across different diseases and populations, and even within individuals residing in similar populations (Lorig & Holman, 2003). Patients report being satisfied with a shared decision making model that they share with their physician when making decisions about their disease; however, they note that some of their disease-related questions are not answered due to lack of time with their physician (Barr et al., 2005; Cicutto &, Brooks, 2006). This may contribute to the increased symptom burden of COPD and resultant hospitalizations and emergency care visits by patients (Barr et al., 2005).

Patient motivation for self-managing COPD includes feeling better after engaging in activity, fearing the repercussions associated with non-compliance with recommendations (Cicutto &, Brooks, 2006) and physician directives (Eakin & Glasgow, 1997). Some of the reasons for lack of compliance with self-management guidelines include limited knowledge acquired from a physician (Barr et al., 2005; George et al., 2005; Jones, Hyland, Hanney, & Erwin, 2004; Koning, Maille, Stevens, & Dekker, 1995), having never attended a structured educational and/or pulmonary rehabilitation program (Barr et al., 2005; Cicutto &, Brooks, 2006), and having a perceived, personal lack of influence on COPD progression (Dowson et al., 2004). Patients who are able to cope with shortness of breath are more likely to be satisfied with the health services they are provided (Fan et al., 2005). Survival skills, such as what to do during an exacerbation, how to prevent COPD from becoming worse, and how to maintain ability to complete activities of daily living, are of primary interest among COPD patients (Carlson et al., 2006). Patients must learn to engage in various activities that promote health during the spiraling progression of COPD (Bourbeau & Nault, 2007). It is important to be cognizant of the fact that generic health knowledge is fairly easy to transmit, but changing self-efficacy and the value patients place in preventive behavior can take strategic effort and tactical planning.

Theoretical Background

There are two conceptual frameworks that inform the research project described. The first framework uses psychosocial theories of self-efficacy that explain and predict one's ability to engage in behavior. The second framework uses Consumer Information Processing Theory (CIPT) to explain and predict health promoting behaviors.

Self-Efficacy Theory

Self-efficacy refers to one's confidence in their ability to control, organize and execute a course of action required for performing specific tasks that will lead to certain outcomes, and is a core determinant of behavior under social cognitive theory (Bandura, 1997). While knowledge of health risks and benefits creates a precondition for change, there are important self-influences (such as self-efficacy) in play which help individuals initiate health behavior change and sustain changes over the duration of their lives (Bandura, 2004). Self-efficacy is an important determinant within social cognitive theory, because it affects health behavior directly and impacts other determinants of behavior change such as expectancies (both positive and negative). Beliefs of self-efficacy expectancies play an integral role in chronic disease self-management, because individuals need to feel empowered to successfully perform activities which can lead to positive disease-related outcomes. Studies have shown that those with low self-efficacy shy away from health behavior change even if they are knowledgeable about the positive behavioral impacts on disease and feel vulnerable to the consequences of illness (Rimal, 2000; 2001). Moreover, higher perceived self-efficacy scores are reported among older adults who actively manage chronic disease (Clark & Dodge, 1999).

Belief in one's efficacy to exercise control is a common pathway through which psychosocial influences affect the adoption and maintenance of health behavior change (Bandura, 2004). Working in concert with the assumptions of human capability and expectancy (Bandura, 1977), all cognitive and behavior change activates through an individual's perceived self-efficacy (Bandura, 1997). Individuals must not only believe that their behavior can cause a positive outcome, but they must also believe that they have the capability to accomplish the behavior completely and successfully (Bandura, 1977). Self-efficacy theory has the unique theoretical characteristics of both predicting behavior change and guiding interventions which have the capacity to change health behaviors (Bandura, 1997).

Self-efficacy beliefs shape the outcomes people expect their efforts to produce (Bandura, 2004). Efficacy expectancy is the steadfast belief that one can perform a behavior which produces a desired outcome. Expectancies govern whether or not an individual will engage in behavior. Outcome expectancy refers to the belief that certain behaviors will lead to certain outcomes. Expectancies play an important role in determining which activities or situations a patient will perform or avoid during disease self-management, because patients' expectancies help determine whether or not they will attempt to self-manage their disease. Taking action usually follows enhanced feelings of self-efficacy for executing skills that have been mastered and can be undertaken effectively. Self-efficacy must be considered for a variety of self-management domains, each of which has its own, associated efficacy belief and expectation (Bourbeau et al, 2004). Patients with strong efficacy beliefs are able to persist and accomplish complex tasks (Bandura, 1978).

It is important to note that perceived self-efficacy can influence behavioral compliance, and successful behavioral adaptation can influence perceived self-efficacy (Kaplan, Atkins, & Reinsch, 1984a). Bandura (1982) stated that perceived self-efficacy is one integral link between knowing what to do and actually doing something; therefore, it is important to cultivate perceived efficacy. Successful self-changers combine efficacy beliefs with outcome expectations that benefits will outweigh disadvantages that come with lifestyle changes (Bandura, 2004). Individuals are more motivated to act when past accomplishments are causally attributed to personal abilities, and failures are attributed to lack of effort (Weiner, 1985). Individuals with high self-efficacy related to a particular task will associate failure with external hindrances or reduced effort, while those with low self-efficacy will attribute failure with lack of ability (Bandura, 1997).

Sources of Efficacy Information. Expectations about self-efficacy are based on four sources of information: (a) performance mastery experience, (b) vicarious experience or modeling, (c) emotional or physiological arousal, and (d) verbal persuasion (Bandura, 1997).

Performance mastery (i.e., information derived from mastery of tasks through personal experience) is believed to be the most reliable source for self-efficacy expectations. It involves getting people actively involved in behavior change, by advocating the development and adoption of a specific action plan geared towards achieving a specific goal (Lorig & Holman, 2003). Information that is gathered following the mastery of a task offers people assurance that the information is indeed reliable (Bandura, 1997). When specific tasks are completed successfully, perceived self-efficacy is enhanced, which confirms an individual's capabilities. Task specific efficacy beliefs increase as the patient masters new skills and behavioral modifications. When specific tasks are completed unsuccessfully, self-efficacy beliefs are damaged if the individual associates the poor performance with an inadequate personal skill set (Bandura, 1997). If low self-efficacy is reported, problem solving strategies are used to alter the plan in such a manner that self-efficacy is maximized. A common misconception exists related to the idea that older adults (the primary sufferers of COPD) may possess low personal efficacy beliefs regarding behaviors they feel are difficult. This is not necessarily the case, as increased age does not reduce the relationship between efficacy beliefs and behavior (Ferrini, Edelstein, & Barrett-Corron, 1994).

Modeling, or experiencing an activity by way of observing another (i.e., vicariously experiencing the activity), is another, less influential, source of self-efficacy information. This source of information shows an individual performing a certain behavior successfully, when encountering a specific situation. Self-efficacy information can be vicariously derived through experiences of others by noting others' performance and the consequences stemming from these performances (Bandura, 1997). Learners judge their capability to perform an activity based on how their abilities correspond with that of the model. Models that are seen as similar to oneself have the greatest impact when delivering efficacy information, because model identification is strengthened by observing similar attributes portrayed by like models (Bandura, 1982). Examples of modeling include the use of videotapes, books and Pamphlets to show individuals how to carry out activities (Bandura, 1986). All written and video-based materials depicting models should be developed in accordance with the characteristics of the priority population (Lorig & Holman, 2003). It is preferable to illustrate models overcoming any trials and tribulations associated with behavioral adaptations, as this portrayal has been shown to produce more positive influences on self-efficacy (Bandura, 1977; Strecher, McEvoy-Devellis, Becker, & Rosenstock, 1986).

Personal efficacy information is also acquired through somatic indicators, such as physiological, physical and affective states, all of which can affect intentions to carry out health behaviors (Bandura, 1997). Physiological and emotional arousal and feedback can drastically influence expectations regarding self-efficacy. For example, positive biofeedback about exercise capacity can positively influence personal efficacy beliefs and outcome expectancies regarding physical activity limitations. However, high physiological arousal such as dyspnea, pain, and weakness can diminish self-efficacy beliefs by impairing physical activity performance. Physiological arousal resulting in reduced performance can be interpreted as vulnerability and be accompanied by psychological distress (Carrieri-Kohlman, Douglas, Gormley, & Stulbarg, 1993) and negative self-efficacy beliefs (Toshima, Kaplan, & Ries, 1992). If physical and emotional states are causally associated with activity, then behavioral strategies may be avoided altogether. Hence, health educators are encouraged to reshape negative interpretations of sensory information through education, specifically to enhance personal efficacy (Carrieri-Kohlman, Douglas, Gormley, & Stulbarg, 1993). Symptoms should be explained as having multiple causes, thus leading to multiple strategies that patients can use to manage symptoms (Lorig & Holman, 2003).

A final source of self-efficacy information is gathered through verbal persuasion or social influence. This information is provided through verbally convincing an individual of their own ability to achieve their goals or exerting a social influence to enable persuasive action. Verbal persuasion can be the primary motivator for action or leveraged through advice which endorses sustained effort (Gormley et al., 1993). The persuader must be respected, knowledgeable and provide information in a manner conducive to enhancing personal efficacy (Tsang, 2000). It is suggested to not address the amount of effort needed to acquire skill development (Schunk, 1983); rather, any extenuating effort involved in realizing the attainment of a skill should be experienced by the learner. It is important to note that using verbal persuasion to increase self-efficacy for achieving unrealistic goals can have a detrimental impact on the efficacy development process.

Efficacy information becomes significant and affects human action through cognitive processes (Bandura, 1997). Cognitive processes include cognitive construction and inferential thinking, which can both precede courses of action (Tsang, 2000). Cognitive construction involves individuals picturing behavioral scenarios before they take place and predicting the nature of the outcomes (successful/unsuccessful) resonating from action. Inferential thinking refers to judging how actions may predict potentially volatile outcomes. Those with high self-efficacy expectancy normally expect more favorable outcomes than those with low self-efficacy expectancies. Individuals with strong self-efficacy can persevere through obstacles or barriers and stay focused on a task in order to realize a desired outcome. Bandura (1978) stated that behavior change is more often abandoned by those with negative cognitive bias and low self-efficacy due to personal doubt in the ability to carry out tasks and/or a non-belief that a task will inevitably affect a desired outcome. Efficacy beliefs regarding control of outcomes plays an important role in mediating emotions such as anxiety.

Self-Efficacy Dimensions. Self-efficacy expectations vary on specific dimensions, including level, strength and generality. Each of these dimensions has an impact on performance (Bandura, 1997). Level of self-efficacy refers to ordering of a task according to its difficulty (Tsang, 2000). A specific task within a particular domain of functioning may differ in regards to difficulty and thus influence corresponding efficacy beliefs regarding a task (Bandura, 1997). Efficacy beliefs can be affected by external factors (e. g. different settings and situations) that differentially influence an individual's ability to carry out unique tasks. Consequently, external variables should be taken into consideration during intervention development, as they can affect the levels of threat and self-regulatory requirements encountered by individuals (Tsang, 2000). Strength of self-efficacy expectations is also important, because expectations lie along a continuum from very low to very high and correlate highly with diligence when completing a task (Bandura, 1977). The generality dimension of self-efficacy refers to the extent to which efficacy beliefs can be generalized from one task or domain to another. For example, a COPD patient may have very high efficacy beliefs regarding the use of rescue breathing, which may generalize to purse-lip breathing while walking. It is important to remember that efficacy beliefs may not generalize with different activities, or even within the same activities, if activities are carried out under dissimilar conditions (Bandura, 1977; Strecher et al., 1986). In sum, objectives of structured education should be developed to account for the various dimensions of self-efficacy in order to enhance self-efficacy expectations (Kara & Asti, 2004).

Self-Efficacy and HRQoL in COPD Patients. Changes in self-efficacy have been shown to associate with changes in HRQoL among patients afflicted with chronic conditions (Bandura, 1997; Lorig, Gonzalez, & Ritter, 1999; Lorig et al., 1989). Kohler, Fish, and Greene (2002) examined the correlates of quality of life among a group of COPD patients, with particular interest on the influence of objective lung function measures and psychosocial outcomes (most notably perceived self-efficacy) on HRQoL. A recursive path model was used to investigate direct and indirect relationships between and among objective measures of lung function, psychological measures, and measures of HRQoL. The results from this study corroborated others (Arnold et al., 2005; Kaplan et al., 1984a; Kaplan et al., 1984b; Scherer & Schmieder, 1997; van Schayck et al., 1992), and suggested that the relationship between objective lung function and HRQoL is mediated by other psychosocial factors, such as self-efficacy. Self-efficacy for coping with COPD has been to shown to highly correlate with HRQoL (Tu et al., 1997) and influences HRQoL more so than measures of objective lung function (Kaplan et al., 1984a; Kohler et al., 2002). These findings support a generalized hypothesis suggested by Bandura (1997), who posited, “functional limitation may be governed more by beliefs of capability than by degree of actual physical impairment” (p. 300). Stated another way, individuals with similar levels of physical impairment may achieve different levels of functional outcomes based on their level of self-efficacy. From the research of Kaplan et al. (1984a) and Kohler et al. (2002), the value of assessing psychosocial constructs such as self-efficacy (in addition to biomedical measures) is evident.

Consumer Information Processing Theory

Health communication has been found to raise efficacy beliefs related to health behaviors and thereby foster the adoption of healthy lifestyles (Meyerowitz & Chaiken, 1987). Moreover, health communication can focus on key social cognitive determinants, such as self-efficacy, to develop customized health promotion programming, which can be distributed on a broad scale (Bandura, 2004). Mass communication technologies can be utilized to provide patients with self-management skill development products that can help enhance self-management self-efficacy beliefs.

Theories of consumer information processing provide a framework for understanding why people do or do not pay attention to, understand, and make use of consumer health information (Rudd & Glanz, 1990). CIPT postulates that information must not only be available but also be wanted and believed useful by the consumer. Further, the consumer must possess the time and level of comprehension necessary to process information presented, because consumer decision making involves multiple stages of acquiring, processing, learning, using and evaluating information (Bettman, 1979; Rudd & Glanz, 1990). A central premise of CIPT is that individuals can process only a limited amount of information at one time (Bettman, 1979). Thus, the information must be presented in such a way that the patient is receptive to information that is comprehensible and usable. Consumer Information Processing Theory (CIPT) is most often applicable during individual-level interventions (Glanz & Eriksen, 1993).

Both the quality *and* quantity of health information influence the choices consumers make regarding their own health behaviors. Therefore, it is important that quality educational material directly addresses patients’ health concerns in a targeted format. This is especially important for older adults who suffer from chronic disease. Older adults have limitations in the amount of information they can acquire, use and remember at a given period of time (Constantinidou, & Baker, 2002; van Wynen, 2001), so information must be designed and packaged in a clear, deliberate fashion which facilitates information processing and action. When an abundance of information is presented to older consumers in a condensed period of time, information acquisition and processing can be limited, thereby attenuating the quality of the information presented. The ability to synthesize key health information and provide it to consumers through a medium which is appealing to their needs can greatly augment information retention. To facilitate health information acquisition, CIPT also suggests the use of quality technologies which can distribute accessible messages and enhance the transmission of relevant health information (Rudd & Glanz, 1990).

Systematic Review of COPD Self-Management Education

Effing et al. (2007) published a systematic review and meta-analysis of controlled trials examining the effects of self-management education on health outcomes and health care utilization among patients with COPD. This work consumed other previous reviews of COPD self-management (Bourbeau, 2003) and COPD self-management education (Monninkhof et al., 2003b). Effing et al. served as an update of a previous review done by Monninkhof et al. in 2003. In the former review, no conclusions about the effectiveness of COPD self-management could be stated, because of the numerous outcome measures that were tested in a very few controlled trials.

Only randomized controlled clinical trials and controlled clinical trials with a usual care control group were included in the work of Effing et al. Non-randomized controlled clinical trials and non-controlled clinical trials and results from pulmonary rehabilitation programs were excluded. All of the studies took place after 1985. See Effing et al. for a description of the search methods and terms used to identify pertinent studies and for characteristics of all included trials.

The methodological quality of each study was assessed according to criteria set forth by Jadad (1996), and outcomes were analyzed by computing weighted or standardized mean differences (WMDs or SMDs) with 95% confidence intervals (CIs) for interval level data and pooled odds ratios (ORs) for categorical level data. Statistical variation between studies was evaluated using the I-square statistical measurement (Higgins, Thompson, Deeks, & Altman, 2003).

Fourteen published data sources met the criteria for inclusion in this review (Blake et al., 1990; Bourbeau et al., 2003; Boxall, Barclay, Sayers & Caplan, 2006; Cockcroft et al., 1987; Coultas et al., 2005; Emery, Schein, Hauck, & MacIntyre, 1998; Gallefoss, Bakke, & Rsgaard, 1999; Gourley et al., 1998; Howland et al., 1996; Littlejohns, Baveystock, Parnell, & Jones, 1991; Martin et al., 2004; Monninkhof et al., 2003a; Rea et al., 2004; Watson et al., 1997). The modes of education varied some, with 4 studies implementing group education, 9 studies using individual education and one using written education only (See non-italicized items in Table 7). The content included within each intervention was variable (See non-italicized items in Table 8).

Table 7

COPD self-management education delivery modes and length

Research study	Educational delivery mode	Length of education
Blake et al., 1990	Individual education + patient brochure + audiotape	1-4 hours
Bourbeau et al., 2003	Individual home-based sessions + telephone calls	7-8 weeks @ 1 hour each week
Boxall et al., 2006	Exercise program + home-based educational sessions	Exercise program – weekly, fortnightly; educational sessions – 6 per week
Cockcroft et al., 1987	Home visits	10 hours
Coultas et al., 2005	Nurse assisted management	15 session @ approximately 20 minutes each
Davis et al., 2006	*Dyspnea self-management program + individualized home walking prescription*	*3 hours*
Emery et al., 1998	Group education	26 hours
Gallefoss et al., 1999	Patient brochure + group sessions	Maximum of 6.5 hours per patient
Howland et al., 1996	Group education	Stage II-IV: Six 2 hour sessions (12 hours); Stage I: Three 2 hour sessions (6 hours)
Kara & Asti, 2004	Group education	4 weeks of 3-4 sessions per week for about 35-40 min each session
Littlejohns et al., 1991	Individual education	Over a 12 month period
Martin et al., 2004	Individual care plan after interview	Respiratory nurse visits every 3 and 6 months for 12 months
Monninkhof et al., 2003a	Group education	5 sessions @ 2 hours each
Nault et al., 2002	*Workbook + telephone follow-up + case manager available for questions*	*1 hour per week over 7-8 weeks*
Petty et al., 2006	*Customized videotape, standard videotape, or usual care*	*16 weeks*
Rea et al., 2004	Individual meetings	Monthly meeting + one home visit
Soler et al., 2006	*Group educational session + health care visit*	*One educational session + monthly visit*
Watson et al., 1997	Action plan and patient brochure	Less than 1 hour (40% of patients spent 10-20 min; 35% spent 20-30 min)

Adapted from: Blackstock & Webster, 2006; Effing et al., 2007
Note: Studies retrieved through author's primary literature search are in italics.

Table 8

Selected content covered within COPD self-management education

Research study	Content areas
Blake et al., 1990	Relaxation, guided imagery, stress management
Bourbeau et al., 2003	Breathing and coughing techniques, energy conservation, relaxation, inhalation technique, simple home exercise, using action plan
Boxall et al., 2006	Anatomy/physiology of lungs, respiratory devices, breathing techniques, secretion removal techniques, energy conservation, stress management
Cockcroft et al., 1987	COPD knowledge, symptoms, coping
Coultas et al., 2005	Not described
Davis et al., 2006	*Purse-lip and diaphragmatic breathing to manage shortness of breath*
Emery et al., 1998	COPD knowledge, coping, interpreting pulmonary function tests, understanding arterial blood gases, stress management
Gallefoss et al., 1999	COPD knowledge, medication, exacerbations, inhalation technique, relaxation, coping
Howland et al., 1996	Stage II – IV: COPD knowledge, nutrition, exercise; Stage I: prevention, smoking cessation, physical endurance, managing stress
Kara & Asti, 2004	Breathing techniques, coughing techniques, relaxation, medication, diet, exercise
Littlejohns et al., 1991	COPD knowledge, inhalation technique, disability
Martin et al., 2004	Medication, oxygen, using action plan
Monninkhof et al., 2003a	COPD knowledge, inhalation technique, coping, exercise, nutrition, energy conservation, action plans
Nault et al., 2002	*Using inhaler devices and performing diaphragmatic and purse-lipped breathing techniques*
Petty et al., 2006	*Education on disease-specific exercise*
Rea et al., 2004	Manage symptoms, when to call doctor, use of inhalers, immunizations, action plans
Soler et al., 2006	*Use of inhalers, exercise, nutrition, sleeping habits*
Watson et al., 1997	COPD knowledge, exercise, coping, nutrition

Adapted from: Blackstock & Webster, 2006; Effing et al., 2007
Note: Studies retrieved through author's primary literature search are in italics.

Follow up time between treatments ranged from 2 to 24 months. All but two of the studies were randomized control trials, and only two studies failed to report a description of participant withdrawals and dropouts. Just over ¾ of the studies scored the maximal score for methodical quality (i.e. 3) as assessed by the criteria set forth in Jadad (1996). What follows is a description of the meta-analytic findings pertaining to the impact of self-management education on HRQoL and objective lung function, as these outcomes are of interest for the purposes of this investigation. It is important to note that outcomes regarding COPD self-management self-efficacy and information needs were not identified or included in this review.

HRQoL

The St. George's Respiratory Questionnaire (SGRQ), developed by Jones, Quirk, Baveystock and Littlejohns in 1992, was used to measure disease-specific HRQoL in seven of the reviewed studies (Bourbeau et al., 2003; Boxall et al., 2006; Coultas et al., 2005; Gallefoss et al., 1999; Martin et al., 2004; Monninkhof et al., 2003a; Watson et al., 1997).

The data from all studies except for Martin et al. (2004) were subjected to a meta-analysis which determined the effect of self-management education on disease-specific HRQoL (See Table 9). The SGRQ-total and -domain scores in the self-management groups were all lower (indicating a better disease-specific HRQoL) or equal to the scores in the usual care control groups. The differences on the SGRQ-total (WMD -2.58; 95% CI (-5.14 to -0.02)) and impact scores (WMD -2.83; 95% CI (-5.65 to -0.02)) reached statistical significance at the .05 level, but did not reach a level of clinical significance (i.e., an improvement of 4 points). No statistically or clinically significant differences were found on either the SGRQ-symptom (WMD-1.45; 95% CI (-4.41 to 1.51)) or -physical activity (WMD -2.88; 95% CI (-5.9 to 0.13)) scores to indicate that self-management groups were better no off than control groups on these dimensions (Effing et al., 2007).

Rea et al. (2004) used the Chronic Respiratory Questionnaire (Guyatt et al., 1987) to assess disease-specific HRQoL.

Table 9

Selected meta-analytic comparisons between self-management and control groups for differences in HRQoL and lung function

Outcome scales and subscales	Number of studies	Number of participants	Statistical method	Test for overall effect	Effect size
HRQoL: SGRQ total	**7**	**698**	**WMD (Fixed) w/ 95% CI**	***z* = 1.98, *P* = 0.05**	**-2.58 [-5.14, -0.02]**
HRQoL: SGRQ symptoms	7	698	WMD (Fixed) w/ 95% CI	*z* = 0.96, *P* = 0.3	-1.45 [-4.41, 1.51]
HRQoL: SGRQ activity	7	698	WMD (Fixed) w/ 95% CI	*z* = 1.87, *P* = 0.06	-2.88 [-5.90, 0.13]
HRQoL: SGRQ impacts	**7**	**698**	**WMD (Fixed) w/ 95% CI**	***z* = 1.97, *P* = 0.05**	**-2.83 [-5.65, -0.02]**
Gen. HRQoL: SIP total	2	249	WMD (Fixed) w/ 95% CI	*z* = 0.14, *P* = 0.9	0.30 [-4.00, 4.60]
Lung function: pred. FEV1%	6	552	SMD (Fixed) w/ 95% CI	*z* = 0.52, *P* = 0.6	0.04 [-0.12, 0.21]

Note: Statistically significant findings at the α = .05 level are in **bold**
Source: Effing et al., 2007

When patients were exposed to self-management education, they revealed statistically significant improvements within two of the four dimensions in this scale (fatigue and mastery). The Medical Outcomes Short Form-36 survey instrument (Ware & Sherbourne, 1992) was used to assess general HRQoL in two of the reviewed studies (Coultas et al., 2005; Rea et al., 2004), but there were no differences found between educational treatment and control groups (Effing et al., 2007). General HRQoL was also measured by the Sickness Impact Profile (Gilson et al., 1975) in three studies (Blake et al., 1990; Emery et al., 1998; Littlejohns et al., 1991). Findings from these studies were inconsistent, but two of the three (Blake et al., 1990; Littlejohns et al., 1991) showed the educational intervention group to exhibit better physical function. The collective data from the three Sickness Impact Profile studies were not suitable for meta-analysis (Effing et al., 2007). HRQoL was also measured by a variety of other instruments in 4 other studies (Cockcroft et al., 1987; Coultas et al., 2005; Gourley et al., 1998; Howland et al., 1996). Only Gourley et al. (1998) and Coultas et al. (2005) found improved HRQoL among participants receiving self-management education.

Objective Lung Function

Six studies (Bourbeau et al., 2003; Emery et al., 1998; Gallefoss et al., 1999; Littlejohns et al., 1991; Rea et al., 2004; Watson et al., 1997) assessed lung function as the percentage of actual FEV_1 in relation to predicted FEV_1 (predicted FEV_1 was calculated based on age, gender, and height). No statistically significant difference in deterioration of FEV_1%-predicted was seen between the self-management intervention and control groups (SMD 0.04; 95% CI (-0.12 to 0.21)).

Summary

In regards to HRQoL, a positive trend was observed, indicating that exposure to self-management education results in better HRQoL outcomes. The improvement was regarded as too small, however, to reach clinical significance. In addition, self-management education was found to have no effect on lung function. Given that the modification of declining lung function in patients with COPD is very difficult (even with long-term pharmacotherapy) (Yang et al., 2007), it should come as a no surprise that lung function did not improve over the courses of these study periods (Effing et al., 2007).

Another Systematic Review

Blackstock and Webster (2006) conducted a systematic review to determine the benefits of disease-specific health education for patients with COPD. They conducted database searches of Medline, CINAHL, PsyINFO, Embase, Cochrane Library, and Physiotherapy Evidence Database; however, their search did not retrieve many unique articles not evaluated by Effing et al. (2007). In addition, Blackstock and Webster (2006) reported being unable to conduct a meta-analysis due to, “a very broad variety of outcomes and follow-up periods” (pp. 703). Of the 13 articles they reviewed, 11 were included in the systematic review and meta-analysis conducted by Effing and colleagues (2007). As with the systematic review conducted by Effing et al. (2007), only randomized or clinical control trials were included in the review by Blackstock and Webster (2006).

The methodological qualities of these studies were assessed using a modified version of the PEDro scale (cf. Blackstock and Webster, 2006; Physiotherapy Evidence Database, 1999). The methodological quality scores obtained were comparable to the scores calculated by Effing et al. (2007) for the studies which overlapped between the two systematic reviews. Within the Blackstock and Webster (2006) review, patient education was delineated into two types: 1) self-management and 2) didactical education. Didactical education was characterized as instruction disseminated, “in a passive lecture format, with opportunity to interact, but no focus on health behavior change” (pp. 704-705). Of the two educational programs not assessed in Effing et al. (2007), one was a self-management program that took place in a group setting (Kara & Asti, 2004), and the other was didactical and designed for individual use (Tougaard et al., 1992).

While there was little unique data presented and/or evaluated in Blackstock and Webster (2006), there was one study reviewed, which examined the relationship between COPD self-management education and COPD self-management self-efficacy (Kara and Asti, 2004). Within-group improvement in self-efficacy was found among all study participants (including those exposed to a control condition), yet there was no between-group difference in self-efficacy found between participants exposed to self-management education versus a control condition (See Tables 7 and 8 for educational delivery mode and intervention content respectively). This could have been due to the study design or because an a priori power analysis was not conducted to determine the adequate number of study participants needed to detect statistically significant differences (n = 60).

Studies Not Included in Systematic Reviews

Several other peer-reviewed manuscripts were retrieved by the researcher through a primary search of the literature. A majority of these manuscripts included self-efficacy measures as outcomes; yet, some were not randomized or clinical controlled trials, which precluded their inclusion. Like the systematic reviews, however, the following studies primarily examined the effects of self-management education on health outcomes among patients with COPD; studies of the effects of pulmonary rehabilitation programs were not included. All of the studies took place between 1996 and 2006. In order to generate a sample of empirical studies, a search of electronic databases was conducted. These databases included EBSCO, ERIC, PsychINFO, Health Source, MEDLINE, Cambridge, and CSA. The key terms that were used to conduct the literature search were: *self-management, self-management education, self-care, chronic obstructive pulmonary disease, COPD, emphysema, and chronic bronchitis.*

Four articles (Davis et al., 2006; Nault et al., 2002; Petty et al., 2006; Soler et al., 2006) were added to the list of articles reviewed in the two systematic reviews (Blackstock and Webster, 2006; Effing et al., 2007). The educational delivery mode and content delivered within the educational interventions are described in Tables 7 and 8 respectively (in *italics*). Follow up time between treatments ranged from 4 weeks to 12 months. What follows is a description of the pertinent findings from each study related to the impact of self-management education on applicable outcomes.

Nault et al. (2002) used the educational program “Living Well with COPD©” to test its impact on teaching covered inhaler and breathing techniques. The education program was originally developed at the Montreal Chest Institute, in conjunction with the Respiratory Health Network of the Fonds de la Recherche en Santé du Québec Boehringer Ingelheim. The intervention was a disease-specific self-management program, consisting of approximately 1 hour per week of skill-oriented teaching over a period of 7-8 weeks. After participating in this program, patients did not perform better when using the inhaler devices; however, they did exhibit better techniques for both pursed lip and diaphragmatic breathing.

Soler et al. (2006) conducted a one-year randomized control trial of 26 patients to determine the effects of an educational intervention and monthly health visits as compared to standard care for COPD patients. Patients exposed to the experimental intervention demonstrated a statistically significant improvement in HRQoL at the end of the one-year study (as measured by the SGRQ). Specifically, the symptoms domain of the SGRQ showed marked improvements over the course of the study. These improvements in HRQoL were also associated with a reduced number of COPD exacerbations over the course of the study. This study did not report statistically significant improvements in lung function (as measured by FEV_1) over the study duration. Limitations of the Soler et al. study included a small sample size and limited study design (i.e., did not allow for the exploration of effect educational component versus monthly health care visits had on outcomes).

Davis et al. (2006) published a randomized clinical trial undertaken to determine the effect of three types of interventions on self-efficacy to manage dyspnea in COPD patients. This study was presumably based on/from the dissertation project conducted by

Tsang in 2000, entitled, EFFECTIVENESS OF THREE STRENGTHS OF EDUCATION AND EXERCISE ON SELF-EFFICACY FOR WALKING AND SELF-EFFICACY FOR MANAGING DYSPNEA IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE. One-hundred and two participants received one of three self-management interventions. One of the three interventions consisted of a dyspnea self-management program comprised of 3 hours of education and an individualized home walking prescription. The program included sessions that were designed to enhance the four primary sources of self-efficacy information discussed earlier. Enactive mastery experiences were provided with respect to physical activity, modeling was used to demonstrate proper breathing techniques, verbal persuasion was used to encourage self-management behaviors and participants were taught to monitor their own physiological and affective states during physical activity.

Within the Davis et al. study, self-efficacy for managing dyspnea and HRQoL were among the dependent variables subjected to investigation. These outcome measures were assessed using valid and reliable disease- and condition-specific instruments (cf. Davis et al., 2006); however, multiple, univariate repeated measures analyses of variance (ANOVA) were used to assess the effect of treatment (three interventions) and time (2 months) on each of four dependent variables at pre and post test. For a multiple group pretest-posttest design testing multiple dependent variables, it is suggested that a multivariate analysis of covariance (MANCOVA) on post-test scores be conducted, with pretest scores used as the covariate(s) (Dugard & Todman, 1995; Huberty & Olejnik, 2006). Nevertheless, participants who completed the education program exhibited greater dyspnea management self-efficacy at post test on one of the two validated measures of self-efficacy. This occurred even after a severe bonferroni-adjustment was infused to account for the two main effects and one interaction effect ($P < .004$, note: this bonferroni adjustment was not reported in the study). In sum, patients exposed to an education based treatment revealed improved self-efficacy for managing shortness of breath.

Petty et al. (2006) conducted a study to compare the effects of customized videotape education versus a standard videotape and usual care on HRQoL and functional ability among 3 groups of patients with COPD. Patients were categorized based on the severity of their disease and then randomized in a block fashion into 1 of 3 groups: (a) customized videotape, (b) standard videotape, and (c) usual care (i.e., no videotapes). The customized videotapes contained footage thought to improve physical activity behaviors in COPD patients. These video segments were designed based on input from either patients' physicians or pulmonologists and specifically adapted based on the disease status of patients. Participants in the standard group received a set of 2 standard videotapes on exercise and educational information. Two hundred and fourteen patients completed self-administered questionnaires at baseline, 4 and 8 weeks on three outcome measures including HRQoL as assessed by the SOLQ (Fan et al., 2002). Over the eight week study period, participants receiving the customized videotape education demonstrated a statistically significant improvement within the emotional functioning and coping skills subscales of the SOLQ as compared to the two other treatment groups. After implementing a severe bonferroni-correction ($P = .05 / 3 = .01$, note: this bonferroni adjustment was not reported in the study) to account for the increased probability of type I error, the statistically significant difference between the treatment group remained in regards to coping skills. Thus, we can remain relatively confident that the customized videotape education did influence the coping skills necessary to positively affect HRQoL. It is important to note, however, that patients in the customized videotape group reported at least a 5-point change in all 4 subscales of the SOLQ, which has been empirically shown to associate with a functional change in a patient's daily life (Tu et al., 1997).

Qualitative Inquiries

One qualitative study was conducted to discover the important self-management issues (Cicutto et al., 2004) as described from the perspective of patients with COPD. Other qualitative inquiries (Camp, Appleton, & Reid, 2000; Monninkhof et al., 2004a) evaluated patient perspectives of COPD self-management program activities and outcomes associated with these activities. Each of these studies gathered information on the viewpoints of patients pertaining to self-management and self-management education.

Cicutto et al. (2004) conducted focus groups with a purposive sample of patients suffering from COPD in order to understand the self-management activities of COPD patients and the meaning that patients attribute to these activities. Constant comparative analysis was used to dissect the focus group transcripts. The major theme which developed from these focus group sessions centered on the idea of "surviving COPD," which ultimately included adjusting physically and emotionally to the disease in order to achieve a satisfactory level of HRQoL. A common adjustment adopted by patients was a shift towards more planning, pacing, and prioritizing for activities of daily living and disease management (Cicutto et al., 2004). Planned, energy-saving activities included breathing exercises, slow walks and more sedentary forms of recreation. Breathing exercises, along with medication management, were identified as useful strategies for enabling activities of daily living, while aerobic and strengthening exercises were identified as dispensable due to lack of motivation and unpleasant feelings following exertion. Patients expressed being liberal with their prescribed physical activity regimens; whereas, strict attention was paid to prescribed medication adherence. This finding is important, given that shared decision making during all aspects of disease management is encouraged (Clark, Nothwehr, & Gong, 1995). In regards to care and information availability, patients reported the desire to have individualized treatment and education provided by a variety of health professionals. One limitation is this study was the lack of representation among racial and ethnic minorities, whom may have separate and distinct perspectives of COPD self-management.

In order to understand statistically non-significant results of a quantitative investigation measuring change in HRQoL (Monninkhof et al., 2003a), Monninkhof and colleagues (2004a) conducted in depth interviews with a purposive sample of 20 participants. Interviews were audio taped, transcribed and analyzed according to grounded theory. Patients reported that self-management education helped them distribute energy evenly, control symptoms more effectively and manage medication intake. Increased self-confidence and self-determination was also reported, which corroborated findings by Camp and colleagues (2000), who noted self-confidence as an important mediating variable along the continuum of self-management skill adoption and HRQoL improvement. Patients reported no benefits from educational sessions regarding healthy nutrition and weight management. Additionally, the qualitative study showed that the instrument used to assess HRQoL in their quantitative study (SGRQ) may have failed to detect important aspects of patients' HRQoL. Thus, other measures which assess HRQoL in COPD patients should be consulted.

Gaps in Understanding

Further research is needed to refine education strategies designed to facilitate behavioral modification in COPD self-management. When developing self-management programs, it is advisable that the practitioner recognize the dissimilar concerns that are brought to light across different populations, and even within individuals residing in similar populations (Lorig & Holman, 2003). To be effective, self-management education must be developed in accordance with a mutually understood care plan agreed upon between the patient and provider (Bourbeau & Nault, 2007). Methods are required to develop self-management programs which suit the long-term maintenance needs of patients, so that patients can optimally adjust both physically and emotionally to COPD and achieve a satisfactory level of HRQoL. Health educators are directed to target information in an educational program towards patients' unique risk factors so that patients master the self-management skills which are truly important. There have been a limited number of qualitative studies undertaken to advance this understanding (Camp et al., 2000; Cicutto et al., 2004; Monninkhof et al., 2004a). Given the paucity of patient-centered interventions which take into account patient perspectives of COPD (Woo et al., 2006), qualitative inquiry can assist practitioners in developing programs which address self-management issues deemed important by the patient.

Intermediate outcomes such as COPD information needs and self-management self-efficacy are important predecessors to health effects, thus should be reported and compared within COPD self-management education studies. It is important to explore how various instructional strategies affect (a) patients' COPD information needs, (b) COPD self-management self-efficacy, and (c) HRQoL. Only a limited number of randomized or clinical control trials have examined the relationship between COPD disease self-management education and COPD self-management self-efficacy, and no such studies have examine the relationship between self-management education and COPD information needs. Moreover, the results of the studies which have assessed these variables have been generally inconclusive. In addition, the assessment of HRQoL in patients with COPD is very important, because objective measures of lung function may not accurately predict disability (Pitta et al., 2005) and/or even be related to quality of life (Arnold et al., 2005; Killian, Summer, Jones, & Campbell, 1992; Hesselink et al., 2006; Jones, 2001; van Schayck et al., 1992; Williams, 1989).

It is unclear as to what type of educational treatment optimally increases feelings of self-efficacy regarding COPD self-management. A better understanding of the actual nature of the educational treatment delivered and its relationship to perceived efficacy towards self-management and HRQoL is important to understand and is encouraged for future research efforts (van der Palen et al., 2004). Past research efforts have not addressed these outcomes in an appropriate multivariate context (Davis et al., 2006; Petty et al., 2006).

Conclusions

Due to rising health care costs stemming from increased use of health services to control COPD, there is growing pressure placed on health systems to find ways to limit, ration and delay health service utilization among COPD patients. Effective chronic disease self-management is one such way to reduce health services utilization and improve HRQoL. In light of the effectiveness of some COPD self-management programs, health educators have been encouraged to develop cost-effective, readily accessible COPD self-management education programs which focus on a) defining the true effective elements of COPD self-management education and b) describing self-management skills and behavior change. This call to action is not without its difficulties, however. Understanding COPD self-management behaviors is complex and represents a black box for health care professionals (Cicutto et al, 2004). While transmitting generic health knowledge is fairly easy, changing self-efficacy and the value patients place in preventive behaviors can take considerable planning and effort. Patients must be taught to self-manage their disease, rather than told to learn to live with it (Bourbeau, 2004). A customized intervention using audio-visual based technologies could offer a stabilizing effect for COPD progression and thus positively impact HRQoL. This innovative intervention could be especially important for patients who do not have access to costly pulmonary rehabilitation programs (Petty et al., 2006).

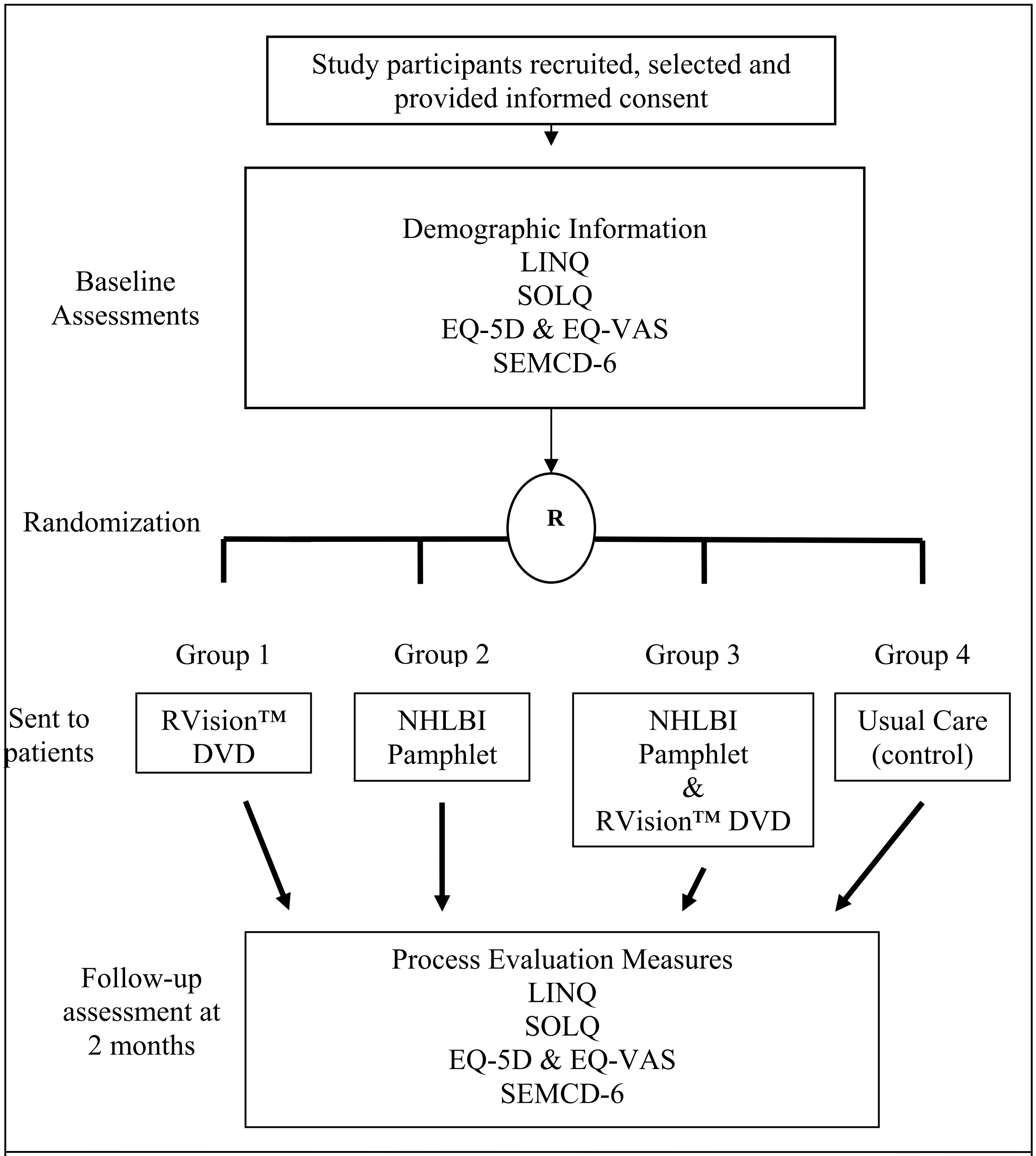
As Blackstock and Webster (2006) noted, "…self-management education results in greater improvements in health outcomes, and as such future research into educational programs should focus on this educational strategy and may like to base their programs on the framework of the Social Cognitive Theory of Health Behavior" (pp. 715). Programs designed to impact behavior and the precepts of behavioral adoption through educational means seem to represent the most supportive and practical strategy to initiate and sustain improvements in COPD self-management. Research examining the most effective and efficient self-management education delivery modes, forms and content is now recommended for future research endeavors (Blackstock & Webster, 2006; Effing et al., 2007). Future studies with sufficient sample size and ample follow up time should look at the acquisition of self-management skills and behavioral change and determine the crucial elements of COPD self-management programming (Effing et al., 2007).

CHAPTER III

METHODS

Overview of Design and Methods

This study assessed the self-management learning needs and perspectives of COPD patients through focus group interviews, and took what was learned during these interviews to help develop a specific, self-management education intervention using DVD technology. Following the development of this specific educational intervention, the effectiveness of three distinct educational treatments (including the newly developed one) was evaluated by comparing outcomes related to (a) COPD informational needs, (b) COPD self-management self-efficacy, and (c) generic and lung-specific HRQoL in a randomly-assigned, multiple-group pretest-posttest design with a control group. Figure 3 presents a graphical depiction of the research design. This particular research design reduces selection bias and increases analytical efficiency (Huberty & Olejnik, 2006).



A multiple-group pretest-posttest design with pre- and post-tests. Group 1 will be provided with the edited RVision™ DVD clips. Group 2 will be provided with the NHLBI educational Pamphlet. Group 3 will receive both educational materials concurrently. Group 4 will not receive any educational materials.

Figure 3. Multiple-group pretest-posttest study design

The Priority-Sequence Model (Morgan, 1998) was used to assist in the priority and sequence decision making for the research design. A Qualitative Preliminary design (qual → QUANT) (Morgan, 1998) was incorporated into the research, given that a smaller, qualitative study was appropriate to inform the educational content to be tested within the primary quantitative study. The utilization of both methods sequentially has been recommended for health education research endeavors (Green & Lewis, 1986). It was proposed that a qualitative inquiry would improve the effectiveness of instructional material by matching educational content to the needs and preferences of a subset of the priority population. Moreover, what was learned in the focus groups could add to the research design's overall ability to meet specified study objectives (Morgan, 1998). Focus group interviews have proven to be a useful research technique for identifying older adults' beliefs and needs regarding specific health topics (Keller et al., 1987). A phenomenological inquiry was conducted in hopes of achieving data saturation (i.e., no longer hearing new information), which would provide understanding as to the meaning that COPD patients associate with COPD self-management. Qualitative data yield thick and rich descriptions which are contextualized based on the multi-causal experiences people endure (Onwuegbuzie & Leech, 2004). Thus, this type of inquiry makes sense of experiences by uncovering the meanings that people associate with various events (Denzin & Lincoln, 2005).

Setting

COPD patients were recruited from Choctaw Urgent Care (CUC), located in Butler, Alabama, which is situated within the district lines of Choctaw County. Butler is a rural town, with a low socioeconomic civic makeup. In 2003, it was reported that almost 20% of the population of Butler lived below the poverty line (National Association of Counties, 2004). Twenty-four percent of Choctaw County is farmland, and Choctaw is one of 42 counties classified as “rural” in Alabama (Alabama Rural Health Association, 2003). Butler is a diverse municipality, with 43.9% of its citizens being of African-American decent, and 52.8% being female. In addition, over 15% of Butler’s population is comprised of citizens over 65 (National Association of Counties, 2004). Choctaw County has been designated as a Health Professional Shortage Area by the Federal Office of Health Professions (The Alabama Medical Education Consortium, 2006). CUC stands as the *only* rural health clinic in Butler, and it is owned and operated by Rush Hospital based in Meridian, Mississippi. While Rush Hospital operates a senior health clinic to meet the unique health needs of older adults in Meridian, it is almost 40 miles away from Butler. This significant geographic barrier limits the accessibility of specialized health services for older COPD patients residing in Choctaw County.

Sample

Qualitative

A purposive, homogeneous sample of patients with COPD was recruited within Choctaw County using. Homogeneous sampling was used because participants needed to possess a clinical diagnosis of COPD, and because this sampling approach is often used to select focus groups (Onwuegbuzie, Jiao, & Bostick, 2004). Within each of the two focus groups, 6 patients were recruited. This number was selected for each group based on three reasons: (a) best practice minimum recommendations for phenomenological research (Krueger, 2000; Morgan, 1997; Morse, 1994), (b) the desire to obtain an in depth understanding of the topic and high involvement from the participants (Morgan, 1998), and (c) the novice skill-level of the moderator.

Inclusion Criteria.

1. Adults 50 years of age or older
2. Clinical diagnosis of COPD
3. Presence of dyspnea
4. No formal COPD self-management education exposure within the last 6 months
5. Provision of informed consent

Exclusion Criteria.

1. Participation in structured pulmonary rehabilitation programs wherein self-management activities were pre-selected

Quantitative

A purposive sample of 56 patients was selected upon meeting certain pre-established criteria (e.g., diagnosis of COPD). Participants were enrolled in the multiple-group, pretest-posttest design study and randomly assigned to treatment groups.

Inclusion Criteria.

1. Adults 50 years of age or older
2. Clinical diagnosis of COPD
3. Presence of dyspnea
4. No formal COPD self-management education exposure within the last 6 months
5. Provision of informed consent

Exclusion Criteria.

1. Participation in structured pulmonary rehabilitation programs wherein self-management activities are pre-selected
2. Housemate who previously agreed to participate in study
3. Being incapacitated to the point where COPD self-management is not feasible

Procedures

Qualitative

Preliminary information, such as patient medical diagnosis and age, was obtained through a telephone interview conducted by the principal investigator with potential patients. For patient recruitment purposes, promotional advertisements were placed at CUC, around prominent community centers, and in the local newspaper (i.e. Choctaw Sun) (See Appendix A for sample advertisement). Other proactive recruitment strategies included physician referrals and telephone contacts. Interested patients were screened for gender and race/ethnicity to ensure comparable numbers of men and women and desired diversity of race. Written informed consent was obtained from each participant before their participation. Each participant was provided with refreshments during the one-hour focus group along with a $20 honorarium for their participation. Institutional Review Board (IRB) approval # 2007-0421 was secured from Texas A&M University (TAMU)'s Office of Research Compliance on July 31, 2007 and renewed until July 30, 2009, for all aspects of this study. The consent form provided to all participants can be found in Appendix B, and the focus group rubric used to guide the focus group interviews is provided in Appendix C. The focus group sessions were facilitated by the principal investigator at CUC with assistance from a certified nursing assistant. At the end of each focus group session, member checking was done to confirm the initial interpretations of the moderator (i.e., basic descriptive triangulation, see Leech & Onwuegbuzie, 2007) and enhance the descriptive and interpretive validity of the data analysis (Maxwell, 2005). Focus group interviews were transcribed using paper and pencil with the aid of a digital audio recorder. Following transcription, multiple qualitative data analyses were employed in order to understand better the phenomenon of interest (Leech & Onwuegbuzie, 2007). Using the data gathered during these focus groups, and taking into account input from the Medical Director of CUC, the intervention materials and instruments for the quantitative study were adapted and developed.

Quantitative

Potential participants for the quantitative aspect of the study were initially approached by the Medical Director of CUC to determine participation interest. If patients agreed to be considered as potential participants, he/she provided written confirmation acknowledging their willingness to take part. COPD patients who did not visit the rural health clinic for an appointment during the recruitment time period were contacted via telephone by a certified nursing assistant at CUC and asked to visit the clinic to provide written confirmation should they choose to participate. For patient recruitment purposes, an incentive program was initiated to encourage CUC personnel to recruit and retain study participants. Following this first phase of recruitment, CUC staff was asked to make telephone contact with potential participants to verbally tell patients

(a) how the study would be carried out and (b) what the terms of their participation were. The principal investigator provided telephone scripts for CUC personnel to use when making these telephone calls (See Appendix D for telephone scripts addressing potential patients). The staff at CUC was collectively remunerated based on how many phone calls were made (i.e., $5 per call). In all, 101 patients were initially contacted.

Potential participants were then screened to determine their race/ethnicity, gender, age, writing ability, educational level, income and marital status via an in-person consultation with each patient. Previous pulmonary function tests were also retrieved by CUC personnel to confirm diagnosis of COPD, thus ensuring patients' qualification for the study. Eligible patients were selected from those who agreed to participate, as most patients in the sample indicated that they had access to a DVD player when initially interviewed by CUC staff. Selected patients were sent, via postal mail, a detailed study description approved by the TAMU human subjects committee, an informed consent document (See Appendix E), and pretest instruments via regular mail. Additional information contained in these mailings reminded patients to (a) fill out the enclosed survey and return it in the pre-paid postage envelope provided to them and (b) look over any educational material provided in the initial mailing. Appendix F provides a sample set of instructions sent to participants in a treatment group. Each participant was offered a $40 honorarium for their participation in the study and were asked to review, sign and complete each form and return the materials to the principal investigator. The pretest instruments included adapted versions of the:

1. Lung Information Needs Questionnaire (Hyland, Jones, and Hanney, 2006) (Appendix G),
2. Seattle Obstructive Lung Disease Questionnaire (SOLQ) (Tu et al., 1997) (Appendix H),
3. EuroQol-5 Dimension Scale (EQ-5D) and EuroQoL-Visual Analog Scale (EQ-VAS) (EuroQoL, 1990) (Appendix I), and the
4. Self-efficacy for Managing Chronic Disease 6-Item Scale (SEMCD-6) (Lorig et al., 2001) (Appendix J).

The questionnaire items were completed using paper-and-pencil. Participants were provided with a prepaid postage envelope to return their informed consent and responses to these pretests to the principal investigator. Participants were also given the option to complete the survey items via telephone, whereby a staff member of CUC would read through each item with the participant and report the participant's response to each item using pencil and paper. The phone interview decreased errors and missing data but required relatively simple survey formats (Guyatt et al., 1993). The completion of these surveys was expected to take participants approximately 20 minutes to complete. For every completed survey that was ultimately received by the principal investigator, the CUC staff members were compensated a set amount of money per returned pretest. This was designed to encourage the staff of CUC to actively ensure that patients were able to complete and return the pretest surveys that were provided or administered to them.

Upon receipt of survey responses, participants were randomly assigned into 1 of 4 groups. Group 1 participants (DVD group) were provided with a targeted RVision™ DVD (RVision Corporation, 2007) to view at home. Group 2 participants (Pamphlet group) were provided with an educational Pamphlet entitled, *Breathing Better With a COPD Diagnosis* (NHLBI, 2007b) to read at home. Group 3 participants (DVD + Pamphlet group) were provided with a targeted RVision™ DVD *and* an educational Pamphlet, *Breathing Better With a COPD Diagnosis*, to view and read at home. Group 4 participants (Control group) did not receive any educational intervention and served as a usual care control group.

Treatment Time Period. Participants assigned to Group 1 viewed the RVision™ DVD clips over a 2-month time period with the assistance of written instructions included in the treatment mailing. These guidelines encouraged the patient to watch the clips as often as necessary in order to adequately ascertain the information needed to perform the COPD self-management skills and behaviors illustrated on the DVD. If participants encountered any technical difficulties when attempting to watch the DVD, they were instructed to contact the principal investigator toll free by phone in order to get assistance and/or a replacement DVD as needed.

Participants assigned to Group 2 read the *Breathing Better With a COPD Diagnosis* Pamphlet over the 2-month time period. The Pamphlet was provided to the participants in a booklet format, along with written instructions for how to use the booklet. The written instructions encouraged the patient to review the material as often as necessary in order to adequately ascertain the information needed to perform the

COPD self-management skills and behaviors illustrated within the Pamphlet. If participants had any difficulties during the 2 month time period when reading the Pamphlet, they were able to contact the investigator to get assistance and/or a replacement copy as needed.

Participants assigned to Group 3 viewed the RVision™ DVD clips and read the *Breathing Better With a COPD Diagnosis* Pamphlet as often as necessary over the same 2 month time period. The written directives were similar to those described above, with the difference being that participants were exposed to both modes of instruction. Participants in Group 4 were not provided with any educational material, as these individuals served as the investigation's usual care control group.

To protect against contamination effects and to control diffusion (Pedhazur & Schmelkin, 1991), both of which were threats to internal validity, participants were asked to keep the educational material(s) provided to them strictly for their own use in order to protect against copyright infringement. After 1 month elapsed during the treatment time period, CUC staff contacted participants by phone to assess progress, answer any potential questions, and remind patients to review the educational material and that a second survey would be mailed to them in the near future. CUC staff members were remunerated for making these status and reminder calls as well. Approximately one week before completion of the two month duration, each participant was mailed a series of follow-up surveys, which were identical to the surveys completed at baseline. As was the case during the pretest time period, for every completed survey that was ultimately received by the principal investigator, the CUC staff members were compensated a set amount of money per returned posttest. Again, this incentive program was designed to engage the staff of CUC in the project and also support patients in being able to use the educational materials and complete and return the posttest surveys.

These surveys were complemented by process evaluation measures (for experimental groups) which assessed participants' perception of educational material(s) utility and frequency of instructional resource use. As such, participants completed the following posttest instruments:

1. LINQ (Appendix G)
2. SOLQ (Appendix H)
3. EQ-5D and EQ-VAS (Appendix I)
4. SEMCD-6 (Appendix J)
5. Process Evaluation Measures (Appendix K)

The posttest instruments were expected to take participants 25 minutes to complete. After completion, participants mailed back the surveys in an envelope with pre-paid postage already attached. Following receipt of all posttests, all study participants were sent a debriefing document regarding the study (See Appendix L), and CUC staff was sent all extra DVDs and Pamphlets to distribute to their patients suffering from COPD.

Treatment Content. RVision Corporation™ (2007) developed a library of education content for home use by patients with COPD. Previous work has shown that patient use of this specific content can result in improvements of quality of life, fatigue and exercise compliance (Petty et al., 2006). Three COPD self-management educational segments cover almost 70 instructional topics. Topics include: pursed lip and diaphragmatic breathing techniques, aerobics and conditioning, infection management/treatment, medication management, smoking cessation, energy conservation, relaxation techniques, cough controlling, nutrition, and walking for exercise. Table 10 lists all content areas covered within each of the 3 segments. These segments run for approximately 1 hour, and 30 minutes in length in total. To condense these segments and target them to the learning needs of the participants in this study, video editing technology was used to compress the relevant patient education topics into 1 interval of approximately 30 minutes. These pertinent segments were loaded onto chapters within a reformatted DVD, so that patients could readily access segments of interest, without having to view the entire DVD at each sitting. Within each segment, sources of efficacy information included performance mastery techniques, role modeling, physiological coping, and verbal persuasion (Bandura, 1997).

Table 10

Content covered within 3 RVision™ DVD segments

COPD Education Segment #1

Content	**Running Time**
Pursed Lip Breathing	55 sec
Diaphragmatic Breathing	1 min, 2 sec
Energy Conservation	1 min, 34 sec
Introduction to Relaxation Techniques	35 sec
Deep Breathing	22 sec
Total Muscle Relaxation	1 min, 39 sec
Visual Imagery	21 sec
Helpful Hints for Relaxation	24 sec
Avoiding Stress	23 sec
Panic Control Breathing	47 sec
Bathing and Showering	1 min, 8 sec
Grooming	32 sec
Dressing	44 sec
Aerobics and Conditioning Introduction	23 sec
Walking for Exercise	2 min, 37 sec
Breath Saver Tips	37 sec
Lifting and Breathing	15 sec
Bending and Breathing	24 sec
Going Up Stairs	39 sec
Infection Control	1 min, 41 sec
Infection Detection	1 min, 1 sec
Infection Treatment	59 sec
When to Call Doctor	1 min 17 sec

COPD Education Segment #2

Content	**Running Time**
Medication Introduction	30 sec
Bronchodilators	36 sec
Antibiotics	44 sec
Metered Dose Inhalers	4 min, 10 sec
Proper Use of Inhaler	41 sec
Digoxin	33 sec
Corticosteriods	42 sec
Side Effects of Prednisone	1 min, 5 sec
Controlling your Cough	47 sec
Nutrition	2 min, 39 sec
Tips for Good Nutrition	6 min, 15 sec
Increasing Your Fluid Intake	1 min, 29 sec
High Potassium Foods	1 min, 2 sec
Diet Hints	49 sec
Weight Management	1 min, 12 sec
Eating Out	48 sec
Avoid Constipation	34 sec

COPD Education Segment #3

Content	**Running Time**
Home Bicycle Program	1 min, 58 sec
House Keeping	1 min, 11 sec
Travel	1 min, 55 sec
Intimate Relations	2 min, 19 sec
Smoking Cessation	1 min, 22 sec

The pre-produced Pamphlet, *Breathing Better With a COPD Diagnosis*, was distributed by the National Heart, Lung and Blood Institute (NHLBI) and available for download at: http://www.nhlbi.nih.gov/health/public/lung/copd/campaign-materials/pub/copd-patient.pdf. This Pamphlet was printed out on a color printer (approximately 4 pages in length), and placed into a decorative folder for patients to use. The content within the booklet included: facts about COPD, information about the pathology of COPD, what to do following a diagnosis, specific action steps for a COPD patient, and advice for seeking medical attention. Table 11 lists content areas included in the Pamphlet.

Table 11

Content covered within Breathing Better With a COPD Diagnosis

Content Headings/Subheadings	**Page Number(s)**
Did you know?	1
What is COPD?	1
What to do when diagnosed with COPD	1
-Quit smoking	1
-Avoid exposure to pollutants	1
-Visit your doctor on a regular basis	1
-Follow treatment advice	1
-Take precautions against the flu	2
-Seek support from other COPD patients	2
How does COPD affect breathing?	2
Taking action	2
-Medications	2-3
-Pulmonary rehabilitation	3
-Physical activity training	3
-Lifestyle changes	3
-Oxygen treatment	3
-Surgery	3
-Managing complications	4
Spirometry	3
When to get emergency help	4
Learn more breath better	4

Measures

Qualitative and Quantitative Antecedents

Demographic information including age, gender, race/ethnicity, marital/relationship status, educational level, income and living arrangements were collected using a demographic questionnaire.

Quantitative Outcome Variables

COPD information need was measured using the *Lung Information Needs Questionnaire* (LINQ). Health related quality of life (HRQoL) was measured with two sets of instruments: the *Seattle Obstructive Lung Disease Questionnaire* (SOLQ) and the *EuroQoL 5D* and *VAS* (EQ-5D and EQ-VAS). This was done due to the relative ease in administering these questionnaires and because one instrument assessed generic HRQoL and the other assessed disease-specific (COPD) HRQoL. It is suggested that both generic and disease specific measures of HRQoL be assessed in order to understand multiple functional outcomes of interventions (Curtis, Deyo, & Hudson, 1994). Other commonly used, COPD-specific HRQoL scales such as the *Chronic Respiratory Questionnaire* (CRQ) (Guyatt et al., 1987) and *St. George's Respiratory Questionnaire* (SGRQ) (Jones et al., 1992) were not used in this research project due to their elevated level of complexity (Jones, 2001). COPD Self-Management Self-efficacy was measured using two scales: The Self-efficacy for Managing Chronic Disease 6-Item Scale (SEMCD-6) and the coping skills subscale of the SOLQ. The SEMCD-6 measures participants' self-efficacy for symptom control, role function, emotional function and communication with physicians, while the subscale of the SOLQ measures confidence for dealing with breathing difficulty. What follows is a description of each of the scales:

LINQ. The LINQ consists of 17 self-reported items that measure the information needs of patients with COPD (Hyland, Jones, and Hanney, 2006). The LINQ can be used to evaluate the impact of educational interventions and is scored to produce an overall score and 6 domain scores (knowledge, medicines, self-management, smoking, exercise, diet). For the purposes of the present investigation, the subscales of self-management and exercise were measured and summed. The minimum total score of this adapted scale was 0 (low information needs), while the maximum total score was 20 (high information needs). The length of time needed to complete the adapted version of the questionnaire was approximately 2 to 3 minutes. The test scores derived from these subscales have fair measures of reliability (α = 0.66 to 0.78) (Hyland, Jones, & Hanney, 2006).

SOLQ. The SOLQ consists of 29 items measuring four health dimensions: physical function, emotional function, coping skills, and treatment satisfaction. Each domain score is transformed on a scale of 0 (worst) to 100 (best). No overall score can be computed, thus each scale is computed as a distinct domain measure. Internal consistency (α = 0.79 to 0.93), test-retest reliability (r = 0.64 to 0.87), construct validity, and responsiveness have been very good when data was collected using all four subscales (Belza et al., 2005; Tu et al., 1997). The meaningful clinically significant difference in the score of the physical function domain has been estimated to be five points (Fan et al., 2002). The coping skills subscale is highly correlated (r = 0.93) with another commonly used measure of self-efficacy in COPD patients (cf. Tu et al., 1997;

Wigal et al., 1991). The SOLQ is self-administered, written on a fourth grade level, and can be completed in 5 to 10 minutes.

EQ-5D and EQ-VAS. The EQ-5D (EuroQol Group, 1990) was developed as a generic instrument for describing and evaluating HRQoL. Five domains of HRQoL are assessed, including: (a) mobility, (b) self-care, (c) usual activity, (d) pain, and (e) anxiety/depression. For each domain, participants are asked to choose from three response option boxes ranging from no problems (level 1) to some problems (level 2) to inability or extreme difficulty (level 3). Each unique health state has an associated 5-digit descriptor ranging from 11111 for perfect health to 33333 for worst possible health (3^5 = 243 possible health states). The descriptive system represents the health state of a patient across the five domains of HRQoL mentioned earlier (e.g., health state 11212 represents a patient that indicates to have some problems on the usual activities and the anxiety/depression dimensions). Weights are used to score the responses to the 5 domains, with scores ranging from 0 to 1 (where a score of 1 represents a perfect state) and then converted to a single index value using a value set derived through a Time Trade Off (TTO) valuation study which reflects the opinions of the general U.S. population (Shaw, Johnson, & Coons, 2005). The EQ-5D valuation measurements have shown good test-retest reliability (EuroQol Group, 1990) and generalizability (Van Agt, Essink-Bot, Krabbe, & Bonsel, 1994). The data derived from EQ-5D have also been reported as internally consistent when measuring HRQoL in rheumatoid arthritis patients (Kind et al., 1998). The EQ-5D has also demonstrated construct validity and responsiveness to change (Hurst et al., 1997).

In addition, the visual analog scale (EQ-VAS) allows patients to rate their current health status from 0 (worst imaginable health) to 100 (best imaginable health) by drawing a line through a thermometer like measure that indicates where each patient falls along a continuum that describes their current health status (EuroQol Group, 1990). Scores for the visual analogue scale reflect the position where the participant's line crosses the thermometer-like scale (American Thoracic Society, 1990). The EQ-VAS scores are patient based and are therefore not representative for the general population. EQ-VAS test scores have been reported to be reliable and responsive to measuring change in perceived health (Hurst et al., 1997).

SEMCD-6. The SEMCD-6 (Lorig et al., 2001) is a 6 item scale that measures participants' self-efficacy to manage chronic disease. The score for the scale is the mean of the six items. A higher number indicates higher self-efficacy. Within this scale, patients are asked to rate their ability to control symptoms, physically and emotionally function, and communicate with their physician. The scales for these items range from 1 (not at all confident) to 10 (totally confident). Test-retest reliability of test scores derived from a question included in the SEMCD-6 was adequate ($r = 0.87$) (Lorig et al., 1996). Evidence of construct validity indicated the item to be statistically significantly correlated with self-efficacy to manage symptoms ($r = 0.62$) (Tsang, 2000). The reliability of test scores obtained from this measure have been high ($\alpha = 0.91$) in previous studies (Lorig et al., 2001). Figure 4 depicts a schematic of study variables and scale measurements.

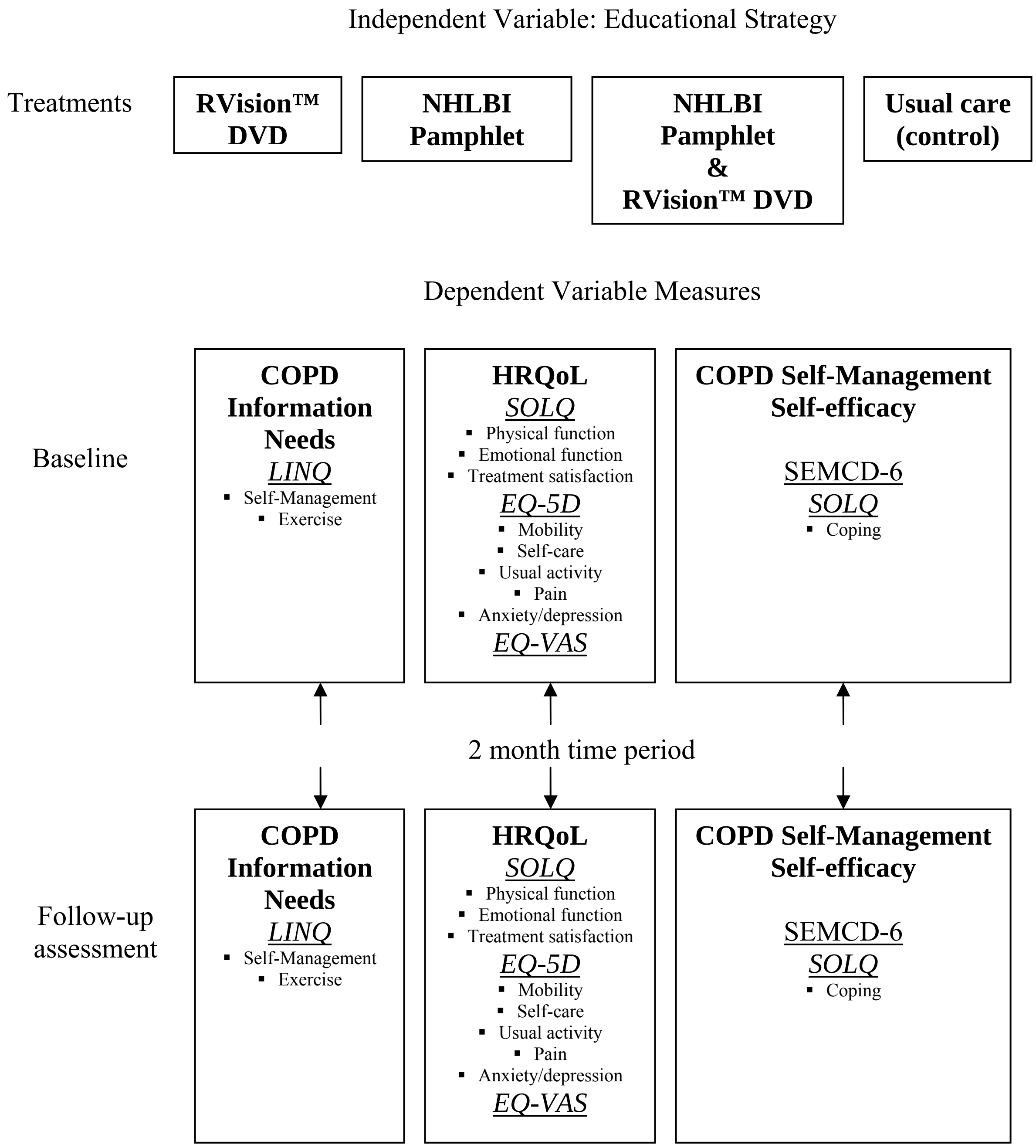


Figure 4. Schematic of study variables and scale measurements

Data Analysis

Qualitative Analysis

The hypotheses for the qualitative portion of the study (secondary aim) were as follows:

> Hypothesis #1: Patients will identify experiences underlying the major theme of surviving life with COPD, with two sub themes being adjusting physically and emotionally (Cicutto et al., 2004).
>
> Hypothesis #2: Patients will discuss the balance between living life and managing disease, with practicing breathing exercises and medication management emerging as the two most effective and readily accepted disease management activities (Cicutto et al., 2004).

Focus group data was analyzed using three distinct qualitative analysis tools: (a) method of deductive constant comparison; (b) classical content analysis, and (c) word count. Three tools were used to analyze the same data at the request of Leech and Onwuegbuzie (in press), who stated that using more than one type of analysis can augment the rigor and trustworthiness of qualitative findings through methodological triangulation.

Constant comparison analysis (Glaser & Strauss, 1967) or "coding" was undertaken deductively to identify general, underlying themes within the focus group data. Prior to analyzing the data, codes were discovered in the qualitative work by Cicutto et al. (2004) and then sought out within the data collected. The entire collected data set was read over and chunks of data (i.e., related portions of the transcript) were grouped into meaningful parts. Following this, chunks were deductively fitted into pre-existing codes which materialized in the work of Cicutto et al. (2004). When chunks did not fit deducted codes, inductive codes were constructed and similar chunks were assigned to these emergent codes. After all of the data were coded, similar codes were grouped together using pre-existing themes from Cicutto et al. (2004) and newly identified thematic groups (i.e., units of data were identified and classified into systematic categories that distinguished unique data properties).

To determine the frequency of themes identified within the data, a classical content analysis procedure was employed to further augment the findings from the method of constant comparison. Instead of creating themes from established codes, the number of times each code emerged was quantified for quantitative saturation across the focus group interviews. This was done to understand which codes were used most, thus cultivating a greater understanding of the most important concepts as reported by the interviewees. If a greater number of codes were identified within a certain thematic category, then that category was deemed to be more relevant.

Lastly, a word count method was used to quantify the number of times a specific word was used during the focus group discussions (Leech & Onwuegbuzie, 2007). Word count is especially useful for focus group analysis, because counts can help identify words spoken the most and those spoken the least (Leech & Onwuegbuzie, 2007). More important and noteworthy words were hypothesized to be used more often (Carley, 1993), thus providing more meaning from the conversation descriptions (Sandelowski, 2001). Additionally, word count assisted the researcher in identifying patterns, verifying hypotheses and maintaining analytic integrity and rigor (Leech & Onwuegbuzie, 2007; Miles & Huberman, 1994).

Upon completing the focus group interviews, the investigator double entered the data into a data-entry interface on a secure computer at TAMU. Each participant was indexed with a unique anonymous identification variable. Data checking and cleaning was carried out immediately after data entry for each participant.

Quantitative Analysis

The hypotheses for the quantitative portion of the study (primary aim) were as follows:

> Hypothesis # 3: Patients exposed to targeted DVD segments (Treatment 1) will outperform patients exposed to the educational Pamphlet (Treatment 2) on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL (Boxall, Hons, Sayers, & Caplan, 2006; Constantinidou & Baker, 2002; Finklestein & Ratner, 2006; Nguyen et al., 2003; Petty et al., 2006).
>
> Hypothesis # 4: Patients exposed to the targeted DVD and educational Pamphlet (Treatment 3) concurrently will underperform as compared to patients exposed to the DVD (Treatment 1) and educational Pamphlet alone (Treatment 2), on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL (CIPT; Rudd & Glanz, 1990).
>
> Hypothesis # 5: Patients exposed to targeted DVD segments (Treatment 1), educational Pamphlets (Treatment 2), and both DVD segments and educational

> Pamphlets concurrently (Treatment 3) will outperform patients exposed to the usual care (control) condition (Treatment 4) on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL (Self-efficacy Theory; Bandura, 1997; Effing et al., 2007).

A multivariate analysis of covariance (MANCOVA) was used to determine the effect of the three instructional interventions on the outcome variables of interest. Pretest scores were used as covariates to adjust for initial differences in the outcome variables. In this research situation, there was random assignment to treatment groups, which made MANCOVA preferable to either a multivariate analysis of variance (MANOVA) on change scores or a repeated measures MANOVA with two repetitions (Dugard & Todman, 1995; Weinfurt, 2000). MANCOVA provided a more powerful analysis of the group effect (Huck & McLean, 1975), since both the repeated measures analysis and gain score analysis required that test occasion measurements be randomized within participants. Given that the pre and post test sequentially followed one another and could not be randomized within participants (Anderson, 1991), the basic assumption of a repeated measures or gain score analysis was violated, thus precluding the use of either during this data analysis.

The overall level of statistical significance for each hypothesis test was set a priori at .02 using a Bonferroni correction ($\alpha = .05/3$) to account for the three contrasts being tested and reduce the probability of experiment wise error. Chronbach's α reliability coefficients were examined to determine the appropriate pretest measure to use as covariate within the MANCOVA model. Covariates were kept to a minimum, possessed especially high measures of reliability (Thompson, 2006), and possessed moderate to strong correlations with the outcome measures (Huberty & Olejnik, 2006). Adding a covariate and running a MANCOVA was intended to increase the power of the analysis by removing the variance associated with the covariate and reducing the overall error variance. The MANCOVA model assumed that the relationship between the pretest variable (i.e., covariate) and each of the outcome variables was the same for all levels of the grouping variable (Huberty & Olejnik, 2006). Thus, the regression slope vectors of the outcome variables on the covariate(s) were to be the same for each treatment group, thus meeting the basic “homogeneity of regression” assumption of the analysis of covariance (ANCOVA) model. An interaction between the grouping variable and pretest covariate would not meet this assumption and forbid ANCOVA. Therefore, a multivariate test of the regression slope vectors was called for using the Wilks lambda test (λ).

Next, a test for the vector of regression slopes that relate the outcome variable to the covariate was conducted. This test determined whether the vector of regression slopes, relating each posttest to the covariate, was equal to zero (Huberty & Olejnik, 2006). The covariate chosen was highly correlated to the posttest outcome variables (Huberty & Olejnik, 2006); thus, the relationship between the covariate and dependent variables and possessed an adequate adjusted effect size (η^2_{adj}). Upon confirming that the homogeneity of regression was not violated and that the correlation between the covariate(s) and posttest variables was relatively strong, a hypothesis test was conducted to determine if the vectors of adjusted means were different across the four group centroids. Due to the a priori expectations that (1) those exposed to the novel DVD instruction would benefit more than those exposed to traditional text-based instruction, (2) those exposed to both the DVD and educational Pamphlet concurrently would benefit less than that those exposed to either the Pamphlet or DVD exclusively, and (3) those exposed to any COPD self-management educational materials would benefit more so than those exposed to no intervention at all, pairwise and complex contrasts were constructed initially and tested, foregoing the omnibus MANCOVA. Three separate nontrend orthogonal planned contrasts (1 pairwise and 2 complex) were tested. These contrasts specifically compared:

1. The outcome variable mean vectors for individuals in the DVD group, compared to the outcome variable mean vectors for individuals in the Pamphlet group
2. The two average outcome variable mean vectors collapsed across individuals in the DVD and Pamphlet group, compared to the outcome variable mean vectors for individuals in the DVD + Pamphlet group; and
3. The three average outcome variable mean vectors collapsed across individuals in the DVD, Pamphlet, and DVD + Pamphlet groups, compared to the outcome variable mean vectors for individuals in the Control group (See Table 12).

Table 12

Orthogonal nontrend planned contrasts

Group	Contrast 1	Contrast 2	Contrast 3
DVD	-1	-1	-1
Pamphlet	1	-1	-1
DVD + Pamphlet	0	2	-1
Control	0	0	3

The following theoretically based hypotheses, which corresponded to the three hypotheses, were posed for the three main overarching outcome measures (COPD information needs; COPD self-management self-efficacy; HRQoL).

a. Contrast 1 – DVD hypothesized to outperform Pamphlet group.
b. Contrast 2 – DVD and Pamphlet groups hypothesized to outperform DVD + Pamphlet group.
c. Contrast 3 – DVD, Pamphlet, and DVD + Pamphlet group hypothesized to outperform the Control group.

If there were statistically significant differences across the centroids of these contrasts and there was an adequate adjusted effect size (η^2_{adj}), then the effect was examined by consulting the resulting eigenvalue arising from each contrast. The vector of adjusted mean differences across the groups included in the orthogonal planned contrasts were computed and listed according to each dependent variable under examination. Next, the structure coefficients between each dependent variable and canonical variable were examined to determine which difference in which outcome measure was most relevant to the makeup of the resultant latent functions. The group adjusted mean centroids were then determined for each group on each identified dependent measure in order to characterize the nature of the group differences on the outcome measures most represented within the latent functions. The primary and/or secondary system(s) of constructs were then identified to best characterize the underlying nature of the canonical variables for each contrast effect.

CHAPTER IV

RESULTS

Timeline of Research Events

Table 13 presents a timeline of research events of the mixed methods study:

Table 13

Timeline of research events

Month	Activities
August 31, 2007	➢ Health Services Research Dissertation Grant (R36) Awarded by Agency for Healthcare Research and Quality
September 2007	➢ Principal Investigator (PI) begins introduction (Chapter 1) and literature review (Chapter 2)
	➢ Initial conversations begin with CUC staff about qualitative and quantitative research protocol
October 2007	➢ Work on Chapter 1 and 2 continues; focus group rubric (Appendix C) is developed
	➢ November 21 is date set for 2 focus group interviews at CUC
	➢ CUC personnel obtains consent during office visits from 20 patients willing to participate in focus groups
November 2007	➢ Chapters 1 and 2 are completed by Principal Investigator
	➢ Principal Investigator contacts 20 participants inquiring about participation in focus groups
	➢ 16 people confirm attendance
	➢ November 21 – PI travels to CUC in Butler, AL to conduct focus groups
	➢ 12 total participants show up in 2 separate sessions (6 in each) lasting approximately 1 hour each
December 2007	➢ PI submits paperwork to TAMU for patient payment of $20 honorarium
	➢ Focus group data analysis by PI begins and ends
	➢ PI works with RVision™ video editing personnel to edit DVD and target it to self-management learning needs identified in 2 focus groups
January 2008	➢ DVD is editing is completed by RVision™ video editing personnel and master DVD is sent to PI
	➢ 125 copies of the master DVD are developed at the Office of Health Informatics at TAMU
February 2008	➢ February 28 - Meeting with doctoral committee regarding quantitative research protocol of study in light of focus group feedback
March 2008	➢ PI begins writing Methods section (Chapter 3)
	➢ CUC personnel begins recruiting patients during for quantitative aspect of study on March 1, 2008 during patient visits and through telephone contacts
April 2008	➢ PI finishes Chapter 3
	➢ April 1 - 101 patients are recruited by CUC staff, randomized into treatment groups, and sent pretest instruments, instructions for participating in study, and self-management educational materials
	➢ Patent recruitment/retention continues
May 2008	➢ Treatment time period
	➢ May 1 - Reminder calls made to patients
June 2008	➢ By June 1 – 56 pretests are received by PI
	➢ June 9 – PI sends 56 patients posttest instruments and instructions for filling out surveys and returning them to PI
July 2008	➢ July 1 - Reminder calls made to patients
	➢ By July 31 – 41 posttests are received by PI
	➢ PI sends out debriefing form to patients completing pre- and post-test
	➢ PI submits paperwork to TAMU for patient payment of $40 honorarium
August 2008	➢ Quantitative data analysis begins and ends
	➢ PI writes Chapters 4 and 5
	➢ September 25 defense date is set

Focus Groups

The demographic characteristics of the 12 focus group participants are described in Table 14. Over half of the participants were female, and the majority did not finish high school. All participants reported an annual pre-tax income between $15,000 and $24,999; thus, participants were of low socioeconomic status. Half of the focus group participants were married, yet an almost equal proportion were widowed or single. The overwhelming majority of participants lived with family, and the mean number of years participants reported being diagnosed with COPD was variable (mean = 6 years; SD = 4.43 years). Patients included in each of these focus groups represented both Caucasian and African American races.

Each of the focus groups (n = 2) were held at CUC in a group meeting room. All of the participants were patients treated at CUC for COPD. None of the participants had prior experience participating in either structured disease self-management education or pulmonary rehabilitation. The lack of exposure to these particular health services was attributed to the absence of specialized programs within Choctaw County. As stated earlier, Choctaw County has been designated a Health Professional Shortage Area by the Federal Office of Health Professions (The Alabama Medical Education Consortium, 2006). Patients reported difficulty traveling to specialized health clinics where focused health services are offered.

Table 14

Focus group demographic characteristics

Characteristics	*n = 12*
Age (mean ± SD)	67 years ± 8.07 years
Gender	
Male	4
Female	8
Educational level	
Grade school	6
Some high school	2
High school graduate	2
Some college	0
College graduate	2
Graduate degree	0
Income	
Less than $14,999	0
$15,000 - $24,999	12
$25,000 - $34,999	0
$35,000 - $49,999	0
$50,000 - $74,999	0
$75,000 - $99,999	0
$100,000+	0
Marital Status	
Married	6
Widowed	4
Single	2
Living arrangements	
With family	10
Alone	2
Number of years since diagnosis (mean ± SD)	6 years ± 4.43 years

Results from Constant Comparison Analysis

Codes reported in the qualitative work by Cicutto et al. (2004) were used to deductively chunk and group qualitative data together into one overall theme and three meaningful subthemes. The overarching theme retrieved from Cicutto et al. was: *surviving and living well with COPD*. This theme was expressed throughout the data collected for these focus groups. In addition, specific subtheme topical areas were utilized to assist in grouping codes together into meaningful concepts. Three specific subthemes reported in Cicutto et al. were: (a) *adjusting physically to COPD*, (b) *using COPD self-management skills to cope physically*, and (c) *using COPD self-management skills to cope emotionally*. These particular subthemes were also expressed throughout the present focus group data. One subtheme emerged inductively from the data and was described as: *coming to terms with COPD and the lifestyle*.

Surviving and Living Well with COPD

The main theme articulated by focus group members in the present study coincided with the predominant theme identified by Cicutto et al. and supported Hypothesis #1. Almost all focus group participants spoke about the inherent difficulties living life while trying to manage symptoms caused by COPD. A variety of health problems were discussed, particularly with regards to patient difficulty balancing their lives with disease management. Two participants explicitly reported symptoms such as congestion, shortness of breath, difficulty coughing, sinus trouble and wheezing. The majority of patients substantiated these symptom claims as being common. Patients also indicated difficulty identifying coping strategies which could ameliorate these specific symptoms:

> About 2 months ago, I began to feel pain in my sides, along with shortness of breath and more wheezing. I could feel the mucus in my lungs, but I can't spit, and the cough that I have is a dry cough. It is like I can feel something in my throat, but there is nothing for me to spit out (F2 P1 #1).
>
> I have a terrible cough and congestion at times during the day, which is just plain hard to get rid of (F1 P6 #1).

Table 15 summarizes the overall theme and the associated subthemes present within the focus group data. In addition, codes used to generate specific subthemes are listed and defined in Table 16.

Adjusting Physically to COPD. Physical adjustments to symptoms caused by COPD were reported by almost all members of the focus groups. Specifically, patients discussed their need to reduce the amount of movement that they engaged in from day to day. In particular, low intensity physical activity, involving a minimal amount of movement, was noted to be suboptimal.

Table 15

Theme and subthemes for data and associated codes

Theme	Subthemes	Codes
Surviving and living well with COPD	- Adjusting physically to COPD	➢ Reduction in movement ➢ Inability to carry out activities of daily living ➢ Purposeful action
	- COPD self-management: adjusting physically	➢ Learning curve for limiting shortness of breath ➢ Medication management ➢ Limited behavioral modifications ➢ Smoking cessation difficulty
	- COPD self-management: adjusting emotionally	➢ Mental anguish ➢ Peer acknowledgement of emotional problems ➢ Uneasy about seeing a psychiatric professional
	- Coming to terms with COPD and the lifestyle	➢ Beliefs about origin of disease ➢ Need for disease compliant lifestyle ➢ Interest in attaining pre-disease quality of life ➢ Acknowledgement of progressive disease course

Table 16

Definitions of codes

Codes	Definition
Reduction in movement	- Limited movement or activity prompted by pending shortness of breath
Inability to carry out activities of daily living	- Being unable to perform common daily activities (walking around the house, cleaning, bathing, tying shoes, etc.)
Purposeful action	- Engaging in thoughtful decision making before any activity is attempted; deliberately carrying out all movement
Learning curve for limiting shortness of breath	- Variability in the ability of patients to know what to do to successfully manage shortness of breath; those experiencing COPD for a longer period of time report being farther along the learning curve
Medication management	- Using prescribed pharmacologic medications for COPD
Limited behavioral modifications	- Undertaking few activities (other than medication ingestion) to self-manage COPD
Smoking cessation difficulty	- Discussion of the difficult process necessary to quit smoking
Mental anguish	- Mental health problems stemming from COPD
Peer acknowledgement of emotional problems	- Group interactions which involved sharing the mental and emotional difficulties encountered by COPD patients
Uneasy about seeing a psychiatric professional	- Discomfort with seeing a mental health professional to discuss depressive and anxiety-related symptoms
Beliefs about disease origin	- Perceptions of how and why patient has COPD
Need for disease compliant lifestyle	- Recognizing that certain activities (medication adherence, rest, deliberate movement, etc.) are necessary to cope with COPD
Interest in attaining pre-disease quality of life	- The desire among patients to retrieve the quality of life they possessed before being diagnosed with COPD
Acknowledgement of progressive disease course	- Coming to the realization that COPD gets progressively worse with time; some stages are worse than others

Movements discussed included basic activities of daily living such as: walking around the house, up and down stairs, and outside to take out the garbage. Participants also reported difficulty simply bending over and standing up straight without losing their breath. Because of these physical limitations, participants reported greatly reducing their overall activity levels:

> Everything I do I am out of breath and out of air. I find that it's sometimes worse than other times. I feel as if I have poor blood circulation to my legs as well, which makes me less wanting to walk around too much. Now that my oxygen level in my blood isn't what it is supposed to be, I find myself always short with air (F2 P2 #1).
>
> Walking? I can't really walk too far at all now (F1 P2 #3).
>
> If I am doing something, anything, and I seem to get real short of breath, then I just cut back. In fact, if you hold your breath a couple seconds longer than you should, then you have to try and catch your breath again. I have to get every drop of breath that I can (F2 P1 #2).
>
> Every time I straighten up, I feel out of breath, even after I do something simple (F2 P1 #9; F2 P1 #2; F2 P2 #1).
>
> Simply put, I am disabled (F2 P1 #1).

In addition, female members of the focus groups talked about their difficulty performing daily cleaning chores around the house. Male members of the focus groups corroborated this difficulty working around the house, but their comments focused more on the taxing responsibility of completing yard work:

> Work is a lot harder for me now, specifically cooking and cleaning. I just can't cook and clean the way that I used to because when I try to do so, I lose my breath (F1 P3 #2).
>
> For me, being a woman, I am finding that it is hard to sweep the floor. I have problems getting enough air in me when I'm doing it. When I bend down and dust to take care of the house, and I walk from room to room, and it just is so hard (F2 P2 #1).

> The dust in the house and animal hair gives me problems as well. Using the Pine Sol and bleach when I am cleaning sometimes gives me an attack. The Lysol spray makes me cough (F2 P1 #2).

> I walk 100 feet outside, and I get out of breath. I do little menial tasks in the yard, and I get shortness of breath and feel weak (F2 P1 #1).

Because of the difficulty patients reported accomplishing their activities of daily living, some noted the need to purposively plan how they went about moving. Patients noted the need to think about what they were going to do before they actually went and did it. In addition, they also felt the need to act in a delayed, deliberate manner to ensure that their actions did not result in shortness of breath. When patients neglected to engage in this thoughtful process, they would accelerate their movements, thus bringing on shortness of breath that was unanticipated and prolonged. These exacerbations occurred when patients attempted to do the most basic of tasks:

> When I pick up the telephone, sometimes the person on the other end says, “You sound like you have been runnin?” They ask me, “Are you running around? Are you having trouble breathing?” And when they say this, I realize that all I did was get up to get the phone (F2 P2 #1).

> I don’t feel it [shortness of breath] coming on. When it first starts, you don’t really pay attention to it, you’re not aware of it. It’s more of a progressive feelin, but it makes you feel really uncomfortable when it hits (F2 P1 #2).

> Sometimes you don’t really see it yourself, but another person notices your problems breathing. It just takes a little time to get your wind back. You just have to sit down and get your breath and relax yourself and then try something else. You can’t just keep going (F2 P2 #2).

> I mean you know what you need to do, but if you push yourself, then you just feel worse, so I’ve learned not to do that [push yourself] anymore (F2 P1 #2).

COPD Self-Management: Adjusting Physically. Patients reported a widespread interest in talking about, and wanting to learn more about, disease self-management strategies which have the potential to improve physical symptoms. Specific emphasis was directed toward learning what could be done to limit bouts of shortness of breath. While some patients reported engaging in some activities to self-manage COPD, others reported not knowing anything about what to do in terms of disease self-management. This was primarily because, for these patients, COPD was a newly encountered disease. For example, two patients expressed concerns about being unsure as to what could be done to improve the physical symptoms of COPD:

> I know absolutely nothing about the disease, and I don't really know how to start asking questions. I don't know what I could do or what I could take to improve the situation. Like I say, at night, if I start to hurt a lot in my lungs, I get up and usually sit up in my recliner, and I'll sit up part of the night. However, I don't really know what I can do to relieve the pain or the fluid. I have actually been scared to do anything. I didn't want to start trying different things like over the counter stuff to get pressure off my chest or get rid of the mucus. Also, I was scared that taking it would do more harm than good (F2 P1 #1).
>
> I actually just found out that I had COPD. I wonder if the disease ever goes away? I don't know what I could do to help it or anything. Since I was just diagnosed, I am waiting on receiving information and then I can start to help treat myself. I see on TV that you are supposed to take longer walks and dance. I haven't tried any of those activities yet though (F2 P2 #1).

Patients who had been living with COPD longer reported being better able to self-manage their disease; moreover, any lack of COPD self-management knowledge was causally related to the relative exposure that patients had dealing with COPD. Because of the variability within this sample in terms of years since diagnosis, the variation in COPD self-management knowledge was to be expected. The comments offered by the focus group seemed to support a continuum of patient knowledge, ranging from little to no knowledge (e.g., reflected by the comments above) to specific knowledge about ways to help manage disease-related symptoms. Particularly, patients reported the regimented use of medication. In fact, almost all patients who had been dealing with COPD for a number of years reported feeling extremely confident in knowing how and when to use prescribed medications:

> I think we all use medication and know how to use the medications. We feel well informed about how to use our medications, whether it be inhalers, nebulizers, or decongestant pills. We always have our pills and medications nearby (F2 P1 #2).
>
> I can't sleep at night unless I have my mask on at night, so I have to know how to put that on (F1 P3 #2).

One patient, however, repeatedly noted that certain types of medications (particularly nebulizers) were no longer necessary for dyspnea management. The use of this particular medication seemed to irritate the patient:

> I feel like I can do anything that I used to do before, and now I think that I can do it better, since I got off that nebulizer (F1 P6 #1). I don't think that I need the nebulizer. I use my inhaler, and I take my decongestants (F1 P6 #5).

There were few behavioral modifications discussed pertaining to COPD self-management. One strategy which was discussed relayed the importance of getting an adequate amount of rest. Patients noted the value of rest throughout the day and getting plenty of sleep at night. Apart from getting enough rest, patients reported a lack of knowledge and skills regarding self-management strategies which did not include taking their prescribed medication(s). Of considerable note was the absence of any patients practicing breathing exercises or controlled coughing, or using any specific relaxation techniques or energy conservation strategies. This was primarily because they had never been exposed to any seminars or informational resources which showed them how to perform these skills. It was interesting to note that patients were very inquisitive about types of activities or lifestyle changes that they could partake in to help reduce COPD symptoms. Patients seemed very interested when the conversation transitioned from focusing on medication management to focusing more on other self-management strategies they were unaware of. Certain passing comments about alternative self-management strategies seemed to elicit particular interest among uninformed focus group participants:

> Physical therapy really helped me a lot, because it helped me lose weight, which really helped a lot (F1 P6 #5).
>
> Water or soda helps clear up the mucus (F1 P3 #2).
>
> I got scared of getting my flu shots, but now I need them to help me feel better (F2 P1 #2).
>
> I know that the flu shot will help, and the benefits will be good (F2 P2 #1).

Additionally, focus group participants raised certain questions and addressed specific learning needs related to COPD self-management. These comments included:

> Is there a certain type of food that you eat that has an effect on your breathing (F2 P1 #2)?
>
> I want to learn more about exercise, because I'd like to walk more effectively (F2 P2 #9).
>
> I want to learn more about relaxation, so I can stay more relaxed. I feel very comfortable saying so too (F1 P6 #5).
>
> I want to be active. I want to do what I have to do to keep going (F2 P1 #2).

Many patients remarked about how they had been encouraged to quit smoking but were unable to due to so. The reasons for being unable to quit ranged from cigarettes being too addictive to the excess expense of smoking cessation aids. Even though smoking cessation was regarded as extremely difficult, patients noted an expressed desire to “kick” the habit. This desire was motivated by patients associating with peers who had successfully stopped smoking:

> I’ve tried to stop smoking, but it is so difficult. I was prescribed medication to help me stop, but it is so expensive. I had no idea those medications were so expensive. (F2 P1 #1).
>
> I have tried and tried to stop smoking, but I just do not know how to get off smoking. I try, but I am not off them. I don’t know how to do it. It’s hard. Other people do it though, so eventually I’ll get it right (F2 P2 #1).

COPD Self-Management: Adjusting Emotionally. Patients in the focus groups reported a range of emotional and mental health issues that were dealt with because of COPD. Primarily, patients discussed frustration with their continued shortness of breath. They also lamented about the depressive symptoms and excessive worry that they felt, which they identified as primarily resulting from the fear of impending exacerbations. Some patients even noted the need to seek psychiatric counseling to help cope with emotional problems caused by COPD:

> I try to do everything I’m told, but I guess I was just worried too much (F1 P6 #1).
>
> I’m used to providing for myself, but since the diagnosis, I’ve been frustrated that I can’t do what I used to. One thing I’ve tried to do is put it in my mind that I have to just continue on and do what I gotta do to get right in my head (F2 P1 #2).
>
> I’ve noticed people with diseases become depressed and not want to take care of themselves. You have to watch yourself, because you might start drinking or doing drugs just because you feel weak. I’ve thought about going to therapy and talking to somebody about what I’m going through. Even though I’m not a big talker, if I see something that will help me, and I’ll go buck wild for it (F2 P1 #2)!

Interestingly, focus group members reported feeling some solace in realizing that others experienced emotional trials and tribulations caused by COPD. Many participants acknowledged that uncomfortable psychological feelings were commonly encountered. In fact, talking about the emotional scars of COPD seemed to have an almost cathartic effect on patients:

> It's good to know I'm not the only one. This is serious problem to me, and I get fired up when I talk about it (F2 P1 #2).

With this being said, some patients reported feeling uneasy with the idea of being treated (by a trained professional) for mental health problems caused by COPD:

> I do feel that going to a psychiatrist is a sign of weakness (F2 P1 #2).
>
> I don't want to get on nerve pills (F1 P6 #4).

Coming to Terms with COPD and the Lifestyle. There was one subtheme which emerged inductively (i.e., not explicitly referenced in Cicutto et al.) during the constant comparison analysis of the focus group data. This subtheme covered how patients rationalize their COPD diagnosis and also how they described the lifestyle prompted by COPD. Surprisingly, patients had various different beliefs regarding the origin of their affliction:

> I think that my diagnosis has something to do with being around fumes when I was working. It's frustrating, but you know you gotta work, so I guess it was gonna happen anyway. It's either because of that or some of the stuff I used to do as a youngster (F2 P1 #1).
>
> I never had problems until I moved down south, when I got chronic bronchitis (F2 P2 #1).
>
> I didn't know why I had the disease. I never smoke, never drank. My ex-husband did, smoke, however. I was around my ex-husband who smoked a lot. I didn't think I'd get the disease though, because we had been divorced since 1974 (F1 P6 #1).

Almost all of the patients in the focus groups acknowledged a need to listen to their doctor's advice regarding the self-care of COPD. Although some patients noted the initial tendency to resist doctors' orders when first diagnosed with COPD, most patients reported succumbing to the idea of a "disease-compliant" lifestyle. Patients began to realize that for life to be good, it would have to be different. Most focus group participants noted that they never regretted deciding to follow their doctor's advice:

> Sometimes I wouldn't listen to my doctor, because I did not want to yield to the disease. I simply refused to believe that the disease was going to get to me. It changes your life though. If you do even a little something, the fatigue…it just wears you out. For the past 4 years, though, I have been "dancing to the music" of what the doctor tells me. I just refuse to let it get me down, even when it messes with me (F2 P1 #2).
>
> I didn't want to claim that I had the disease. I realized, however, that I was hurting myself by not listening (F2 P2 #1).

There was also mention made about the effect COPD had on so-called "enjoyable" life activities. These enjoyable activities ranged from making money to support a family to going on vacation with grandchildren. The idea that COPD inhibited these enjoyable activities was very troubling to many focus group participants:

> When the kids went to Disneyland, I just wanted to keep up with my grandchildren, without having to struggle for air (F2 P2 #1).
>
> It's really affected my work and, in turn, my finances. This has made it more difficult to take care of my relationships as well. This disease can affect your life, and it doesn't quit or leave you alone. (F2 P1 #2).
>
> Thinking about what you can't do is almost worse than not being able to do what you want to do (F2 P2 #1).
>
> I try to impress my friends and not let it look like I'm having problems when we are together. Sometimes I feel embarrassed. It's a disease though, so I guess it's all part of it (F2 P1 #2).

While patients reported feeling annoyed by the deleterious impact that COPD had on their life satisfaction, they were cognizant that COPD is progressive and can get worse. Furthermore, they recognized through observing others that COPD can be extremely debilitating. Because of this, patients reported wanting to do everything they could to maintain their quality of life at a level superior to those whom they've observed to be far more affected by the disease:

> I know this [COPD] is not death though. It just works on your nerves and changes your whole lifestyle. Some people are a lot worse than me though. I just want every drop of information I can get about this thing [COPD] (F2 P2 #1).
>
> It's really a day to day kind of disease. Now tomorrow I might try to do more, because it might be a better day tomorrow. I think that trying to do exercises might help expand my lungs, so I'll try to do more on days when I feel good (F2 P1 #2).

Results from Classical Content Analysis

To complement the results gleaned from the constant comparison analysis, a classical content analysis procedure outlined by Lincoln and Guba (1985) was employed. After all of the data were coded (i.e., units of data were identified and classified into systematic categories that distinguished unique data properties), it was determined the number of times each code was utilized. The most frequently broached concepts included: the inability of patients to carry out activities of daily living, a lack of knowledge regarding COPD self-management behavior modification strategies, and the differential learning curve for managing shortness of breath. Participants also frequently discussed the idea of not moving in excess for fear of breathlessness. Patients reported less frequently discussing the need for purposeful living, which revealed that their current lifestyles were not currently conducive to limiting dyspnea exacerbations.

Figure 5 presents a chart that compares the frequency of the most commonly identified codes present within the focus group data. While there existed some variability in the number of times each code was utilized, there was consensus regarding which subthemes (represented via codes) were most prevalent within the data. All of the frequently used codes were used to identify two of the subthemes initially identified by Cicutto et al and subsequently identified in the present data. These commonly identified codes contributed to the makeup of two related subthemes: (a) adjusting physically to COPD and (b) using COPD self-management to adjust physically to the disease. Thus, there was an expressed need for more information regarding physical adjustments necessary for effective COPD coping.

Results from Word Count

Finally, a word count method was used to quantify the number of times a specific word was spoken during each of the focus group interviews (Leech & Onwuegbuzie, 2007). The word count was implemented on the final transcript using QSR International's NVivo 7.0 qualitative data analysis software program. This software enabled the seamless identification of word patterns present throughout the qualitative data (Leech & Onwuegbuzie, 2007; Miles & Huberman, 1994).

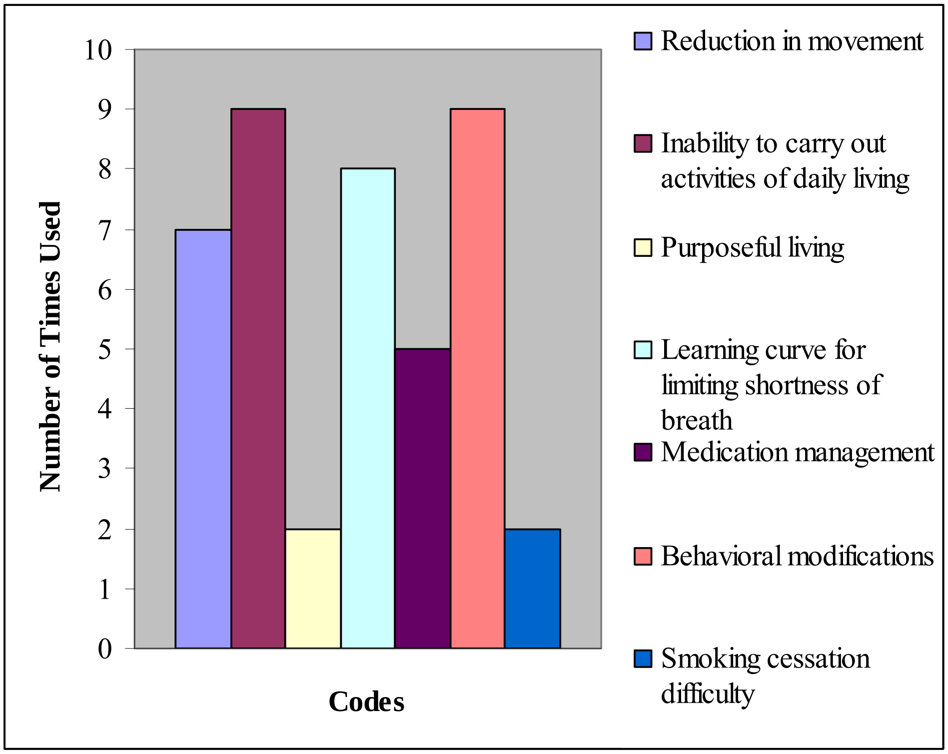


Figure 5. Results from classical content analysis

The most commonly used words within the transcript were: breath, know, feel, want, and don't, with breath being the most commonly cited word. Patients overwhelmingly mentioned the word breath during the course of the focus groups, which revealed how important the maintenance of breath was to both their quality of life and overall perception of COPD. The participants had very strong feelings related to wanting their shortness of breath to be limited. Patients were adamant in their desire to receive any knowledge that could help limit the onset of dyspnea exacerbations. Figure 6 graphically depicts the frequency of the most commonly spoken words.

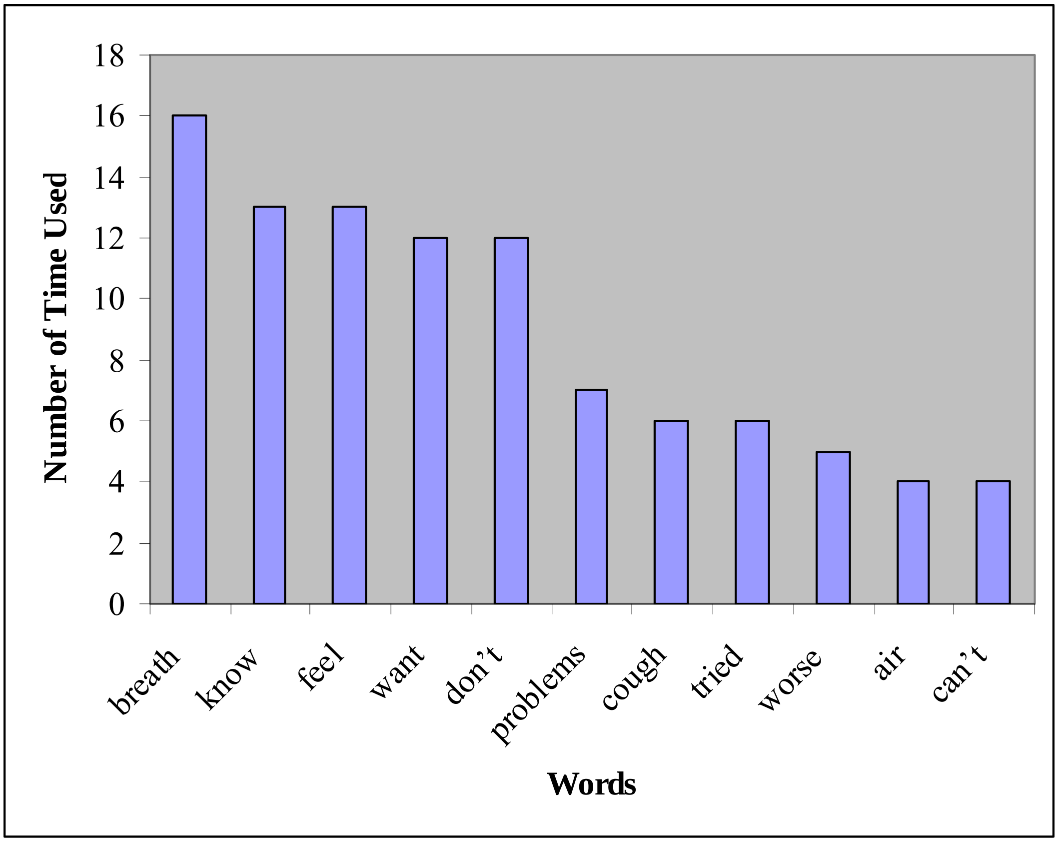


Figure 6. Most frequently used words during focus groups

Lesser used, but frequently mentioned, words such as problems, tried, worse, and can't, were also of note. Focus group participants reported having tried to cope with the numerous problems caused by COPD; but, more often that not, patients reported their symptoms as becoming demonstrably worse no matter what they tried to do. What is more, patients could not readily identify multiple ways to limit the onset of shortness of breath. It was also fascinating to note the omnipresence of words such as want and don't as compared to tried and can't. This differential use of these words may provide unique insight into how patients view surviving and living life with COPD. While most all patients reported an expressed desire to want to do something to self-manage COPD, their efforts don’t necessarily result in the health outcomes they are looking for. Thus, focus group participants seldom reported that they tried to actively limit their shortness of breath. Primarily, this was because patients can’t successfully engage in activities (other than taking medications), which actually served to help reduce dyspnea and exacerbation incidence. In lieu of this, most patients felt reduced to simply taking their medications, with little guidance regarding other options for COPD self-management.

Implications for DVD Editing and Development

In sum, the self-management experiences of COPD patients in these focus groups were limited to taking prescribed medications and reducing movement and activity. Patients reported widespread confidence in regards to managing and using prescribed medications to treat COPD symptoms and also perceived that getting plenty of rest could reduce the shortness of breath that they experienced. However, the focus group participants did not realize the importance of practicing other COPD self-management skills and behaviors, such as practicing breathing exercises. This emergent finding contradicted what was hypothesized (Hypothesis #2), as patients reported a lack of knowledge and skill development related to controlled breathing and coughing, stress reduction, and paced walking/movement. Furthermore, the focus group participants expressed an interest in learning more about these and other novel topical areas, which have been identified as staples within COPD self-management regimens (Bourbeau & Nault, 2007). There were also specific questions raised during the focus group sessions, and various COPD self-management learning needs were discussed.

Given the learning needs identified above, the low educational levels of many of the patients in the sample, and the variability in terms of patient time spent coping with COPD, careful attention was paid to developing the DVD instructional tool based on the focus group data. It was imperative to only include segments that were relevant, comprehensible, to the point and clear. In light of this necessity, a variety of basic COPD self-management topics were chosen for inclusion on the edited DVD. These segments were all produced by RVision™ Corporation (2007). The potential content was chosen from among all possible segments developed and produced within RVision's™ library of COPD self-management education DVDs (see Table 10 for a complete list of all possible topics).

The main topics chosen for inclusion were related to effective breathing, relaxation, basic movements, infection control, nutrition, performing everyday tasks, and smoking cessation. This was due to the fact that there was a multitude of topics included within the DVD library and only selected topics could be addressed on the DVD, in light of the principal investigator's intention to make the educational DVD as succinct as possible with limited health information which could be processed (Rudd & Glanz, 1990). Given the extensive depth and breadth of data which was gathered using the constant comparison analysis technique (while this data proved incredibly insightful), it seemed prudent to utilize the findings from the word count and classical content analysis to better condense the findings and apply them to the editing of the DVD.

Results from the classical content analysis revealed that carrying out activities of daily living, learning how to limit shortness of breath, and behavioral modification were the most often cited codes in the focus group transcript. This justified the inclusion of segments on relaxation, purposeful movement, infection control, nutrition, smoking cessation and performing basic tasks of daily life. In addition, results from the word count indicated that breathing was the most often mentioned phrase, thus 6 segments on breathing techniques were included on the DVD. Thus, the quantitative results garnered from the qualitative study actually proved useful in determining which topics were most prevalent within the focus group needs assessment. The utilization of multiple qualitative data analysis tools (Leech & Onwuegbuzie, 2007) proved especially useful for the DVD formatting endeavor.

It is important to note at this point, however, that only segments which contained novel, pertinent COPD self-management education were selected for inclusion. For example, there were no segments included on medication management, because most patients felt comfortable using their medications, and these segments tended to describe specific prescription medication terminology, which may have confused patients who did not explicitly remember the names of the medications that they were currently taking. In addition, the edited DVD was not intended to bombard patients with an excess of information that they could not remember and use; rather, it was developed in hopes of keeping patients' interest by only including information that they would find to be applicable to their disease self-management (Rudd & Glanz, 1990).

Table 17 presents the content areas included on the edited DVD and the running time for each segment. Each topical area was placed in a unique chapter on each DVD. This was done to allow patients to specifically choose which segments they would like to watch, without being forced to watch the entire DVD at each sitting. This was also done in recognition that there was going to be variability in the types of topics that patients would already be familiar with. The total run time for the entire edited DVD was approximately 34 minutes and 18 seconds. This edited DVD was used as the main instructional intervention tool tested during the primary multiple-group, pretest-posttest study.

Implications for Quantitative Data Collection

The majority of focus group participants expressed difficulty transporting themselves from their homes to the rural health clinic where the focus groups were held. Many patients had traveled from remote parts of rural Alabama and could only do so with assistance from friends and family members. When discussing with the patients the prospect of holding an informational session at the rural health clinic whereby COPD self-management education materials would be distributed, many patients expressed interest, with the caveat that their participation was exclusively incumbent on a variety of variables.

Table 17

Final segments included on DVD (edited)

Content	**Running Time**
Introduction	49 sec
Pursed Lip Breathing	55 sec
Diaphragmatic Breathing	1 min, 2 sec
Energy Conservation	1 min, 34 sec
Introduction to Relaxation Techniques	35 sec
Deep Breathing	22 sec
Total Muscle Relaxation	1 min, 39 sec
Visual Imagery	21 sec
Helpful Hints for Relaxation	24 sec
Avoiding Stress	23 sec
Panic Control Breathing	47 sec
Aerobics and Conditioning Introduction	23 sec
Walking for Exercise	2 min, 37 sec
Lifting and Breathing	15 sec
Bending and Breathing	24 sec
Infection Control	1 min, 41 sec
Infection Detection	1 min, 1 sec
Infection Treatment	59 sec
When to Call Doctor	1 min 17 sec
Controlling your Cough	47 sec
Nutrition	2 min, 39 sec
Increasing Your Fluid Intake	1 min, 29 sec
House Keeping	1 min, 11 sec
Smoking Cessation	1 min, 22 sec
Conclusion	22 sec
Total (approximate)	**34 min, 18 sec**

These variables included: access to the clinic, time of day, day-to-day variation in health state, and also familial responsibilities. In light of these obstacles, and due to the potential contamination effects (i.e. patients being exposed to a non-intended treatments) of bringing the entire pool of participants to one locale in order distribute the educational intervention, it was decided that the best strategy was to send the survey instruments and intervention materials to patients via regular mail to reduce any potential complications. This plan better ensured that patients were only exposed to one treatment condition (i.e., reduce threat to internal validity), would reduce patients' need to travel, and also deliver the educational materials directly to patients at their place of residence (i.e., enhance the convenience for the patient). The medical personnel at the rural health clinic agreed with this strategy as the best option to most efficiently conduct the multiple group, pretest-posttest study. Thus, the instructional strategy shifted from a plan that require limited interpersonal interactions with patients to a plan where "distance" education was the primary means of instruction transmission. For the purpose of this study, distance education can be defined best by Moore (1990) as, "all arrangements for providing instruction through print or electronic communications to people engaged in planned learning in a place or time different from that of the instructor or instructors" (p. xv).

Multiple Group Pretest-Posttest Study

Table 18 presents demographic information for the participants in the quantitative aspect of the study. As reported earlier, 101 participants were recruited to participate in the multiple-group, pretest-posttest study. Fifty-six pretests were completed by willing participants (Pretest Response Rate = 55.4%; Participant Dropout Rate = 44.6%). Of the 56 participants completing the pretest surveys, 41 completed and returned all posttest surveys (Posttest Response Rate = 73.2%; Participant Dropout Rate = 26.8%). The mean age of participants was 61.51 years (SD = 6.29 years). The majority of participants were Caucasian (n = 29), yet more than half were female (n = 25), and one-third were African American (n = 12). Most participants reported educational levels ranging from only grade school to graduating from high school (cumulative % = 80.4), and most participants were married (n = 30). The overwhelming majority of participants reported annual incomes of less than $14,999 (70.7%), which may be attributable to this demographic group living on a fixed income in a low socioeconomic community.

Table 18

Multiple group, pretest-posttest demographic characteristics

Characteristics	*n = 41*
Age (mean ± SD)	61.51 years ± 6.29 years
Gender	
Male	16
Female	25
Race	
Caucasian (White)	29
African American (Black)	12
Educational level	
Grade school	9
Some high school	13
High school graduate	11
Some college	3
College graduate	3
Graduate degree	2
Income	
Less than $14,999	29
$15,000 - $24,999	8
$25,000 - $34,999	2
$35,000 - $49,999	2
$50,000 - $74,999	0
$75,000 - $99,999	0
$100,000+	0
Marital Status	
Married	30
Widowed	3
Single	8

Process Evaluation

Almost 90% of participants (87.5%) assigned to the intervention groups (n = 28) reported that they received the intended educational materials via regular mail. Only the participants who correctly identified the educational intervention they actually received and reviewed were included in the data analysis to protect against Type III error (Schwartz & Carpenter, 1999). Type III Error refers to the notion an intervention has limited or no impact on the outcome variables being examined; thus, the researcher is ill equipped to assess the hypotheses posed (Basch, 1985). Furthermore, Type III error can be defined as, "…when the program is not measured as implemented, when the program has not been implemented, or when there is no testable relationship between the program activity carried out and the program objectives being measured" (Scanlon et al., 1977, p. 264). Over the 2-month treatment time period, participants receiving only the DVD reported viewing the DVD a mean of 1.75 times (SD = 1.91 times), while participants receiving the Pamphlet reported reviewing over it a mean of 2.16 times (SD = 2.76 times). Participants receiving both the DVD and Pamphlet over the 2-month treatment time period reviewed these instructional materials a mean of 3.4 times (SD = 1.71 times). The participants self-reported viewing the materials as instructed (sometimes multiple times); thus, the probability of a Type III error occurring was most likely reduced as one can reasonably assume that the educational interventions were utilized based on instructions provided to patients, and previous research indicates that educational materials such as those provided to patients could help to achieve specified study objectives (Effing et al., 2007). The mean number of views over the 2 month period was not statistically significantly different across the treatment groups, $F(2, 27) = 1.38$, $p = .27$, $\eta^2 = .09$.

Participants were also asked to rate on scales from 1 to 10 how useful they felt the intervention materials were (1 = not at all useful; 10 = extremely useful) and also how understandable they felt the educational materials were (1 = not comprehensible; 10 = extremely comprehensible). The mean utility scores from participants across all treatment groups was relatively high (M= 7.61, SD = 2.36) as were the mean comprehensibility scores (M = 8.21, SD = 2.18). While the overall scores on both measures were high, their differences were not statistically significant across treatments: Utility: $F(2, 25) = .526$, $p = .60$, $\eta^2 = .04$; and Comprehensibility: $F(2, 25) = .119$, $p = .89$, $\eta^2 = .01$.

Pretest and Posttest Data

Table 19 presents means, standard deviations, and reliability indices for all pretest data obtained from the sample of participants who completed both the pre and posttest instruments (n = 41). Missing data was accounted for using procedures published within the scoring guidelines for each instrument. As an example, for each missing item of the SOLQ (for each dimension measured), the user was instructed to assign the average value of the non-missing items associated with that particular subscale. For the pretest data, the mean across all reliability indexes (α) was 0.83 (SD = 0.12); thus, the reliability estimates from the pretest data was judged to be acceptable for all scales. Additionally, the distribution of scores for all the scales was examined, and the skewness and kurtosis statistics were within the acceptable range to warrant further inferential analysis (Tabachnick & Fidell, 2000).

Based on the pre-conceived notion that patient self-efficacy for managing COPD would be highly correlated with both HRQoL and lung information needs, and given that the correlations between the SEMCD-6 pretest and specified outcome variables were moderate to high (upon inspection of the pearson r correlation matrix between pretest and posttest variables), the SEMCD-6 pretest variable was selected as a covariate to statistically adjust for pretest differences which may have existed between treatment group members. This decision was further supported by the pretest reliability estimate of the SEMCD-6 ($\alpha = .97$). All other pretest variables showed minimal correlations with all outcome measures tested, and therefore were not considered for inclusion as covariates due to their limited ability to reduce the overall error variance in the MANCOVA model. Also, there did not exist a statistically significant difference in SEMCD-6 pretest scores across the treatment groups, $F(2, 38) = 1.12$, $p = .35$, $\eta^2_{adj} = .01$, which indicated that the participants were relatively homogeneous with respect to feeling able to self-manage their shortness of breath associated with COPD. Further, as with the other pretest variables, the data obtained from the SEMCD-6 did not violate the normality assumption of MANCOVA: skewness statistic = .27 and kurtosis statistic = -.62 (Tabachnick & Fidell, 2000).

Table 19

Descriptive statistics for pretests

Pretests		DVD	Pamphlet	DVD + Pamphlet	Control	Group	α
SOLQ							
Physical	*M*	17.83	36.84	29.66	35.67	30.16	.94
	SD	14.34	22.63	12.89	14.24	17.49	
Emotional	*M*	35.56	46.67	53.03	54.44	47.69	.72
	SD	24.32	22.44	28.96	13.74	23.63	
Coping	*M*	33.33	55.83	47.35	57.41	48.61	.66
	SD	17.68	20.71	25.09	23.82	23.24	
Treatment Satisfaction	*M*	58.33	68.75	56.82	52.78	59.29	.82
	SD	38.53	33.46	30.80	22.34	31.11	
LINQ-TOTAL	*M*	12.44	8	8	7.78	8.97	.85
	SD	6.06	5.81	4.73	5.78	5.69	
SEMCD-6	*M*	3.44	4.27	4.24	5.48	4.35	.97
	SD	2.67	2.26	2.73	1.91	2.44	

Table 19
Continued

Pretests		DVD	Pamphlet	DVD + Pamphlet	Control	Group	α
EQ-5D	*M*	.54	.92	.59	.62	.68	.64
	SD	.20	.99	.23	.18	.57	
EQ-VAS	*M*	33.44	45	47.45	58.44	46.07	
	SD	19.99	16.1	17.32	10.17	17.83	N/A
n		9	12	11	9	41	

Note: *M* =unadjusted means; *SD* = standard deviation; α = coefficient alpha reliability index

Table 20 presents all posttest data. For all posttests, the adjusted means (i.e., means which statistically took into account pretest differences among participants on the SEMCD-6) are included. Missing data was accounted for using procedures published within the scoring guidelines for each instrument. All of the reliability estimates were judged to be acceptable. The mean across all reliability indexes for the posttest data was .80 (SD = 0.13). Additionally, the distribution of scores from all the posttest scales was examined, and the data did not violate the normality assumption of MANCOVA, as the skewness statistics for the data ranged from -.45 to 1.32 and the kurtosis statistics ranged from -1.06 to 1.88 (Tabachnick & Fidell, 2001).

Data Assumptions

A multivariate test of the regression slope vectors was conducted using the Wilks lambda test (λ) to ensure that the regression slope of the posttest outcome variables on the pretest covariate, SEMCD-6 pretest, was relatively equivalent for all groups being compared. The test provided little evidence to indicate that the mean vectors differed, as $\Lambda = .42$, $F(24, 76.01) = 1.10$, $P = .36$. Moreover, for each of the outcome variables, there was little evidence to indicate that an interaction was present between the grouping variable and SEMCD-6 pretest variable. Thus, the homogeneity of regression assumption of ANCOVA was not violated when considering the data.

Table 20

Descriptive statistics for posttests

Posttests		DVD (n = 9)	Pamphlet (n = 12)	DVD + Pamphlet (n = 11)	Control (n = 9)	Group (n = 41)	α
SOLQ							
Physical	*M*	36.84	20.40	34.81	31.14	30.23	.94
	SD	29.40	18.34	10.97	8.06	18.67	
	AM	39.37	19.93	35.33	28.56	30.80	
Emotional	*M*	46.30	35.00	52.12	51.48	45.69	.74
	SD	30.84	14.11	10.98	17.57	19.75	
	AM	48.04	34.68	52.48	49.70	46.23	
Coping	*M*	41.20	37.50	59.47	60.19	49.19	.71
	SD	16.06	12.56	9.88	31.19	20.63	
	AM	43.40	37.09	59.92	57.95	49.59	
Treatment Satisfaction	*M*	45.83	60.42	60.23	65.28	58.23	.83
	SD	30.62	22.51	14.60	23.20	23.15	
	AM	47.68	60.07	60.61	63.39	57.93	

Table 20
Continued

Posttests		DVD (n = 9)	Pamphlet (n = 12)	DVD + Pamphlet (n = 11)	Control (n = 9)	Group (n = 41)	α
LINQ-TOTAL	*M*	7.33	7.33	9.82	6.89	7.90	.66
	SD	3.46	6.05	5.83	3.48	4.98	
	AM	7.79	7.25	9.91	6.42	7.84	
SEMCD-6	*M*	4.85	7.19	3.30	5.46	5.25	.96
	SD	2.87	1.59	.67	1.57	2.28	
	AM	5.10	7.15	3.35	5.21	5.20	
EQ-5D	*M*	.52	.43	.78	.47	.55	.69
	SD	.30	.18	.12	.20	.24	
	AM	.53	.43	.78	.46	.55	
EQ-VAS	*M*	43.78	67.42	63.64	58.22	59.20	N/A
	SD	27	24.95	19.24	15.44	23.17	
	AM	45.20	67.15	63.93	56.77	58.26	

Note: *M* =unadjusted means; *SD* = standard deviation; *AM* = adjusted mean centroids; α = coefficient alpha reliability index

To statistically confirm that a relatively strong relationship existed between the SEMCD-6 pretest variable and each of the outcome variables, a test of the vector of regression slopes which related the outcome variables to the SEMCD-6 pretest variable was conducted. Results from this test indicated that there was a non-statistically significant relationship between the SEMCD-6 pretest variable and each of the outcome variables at the .02 alpha level, $\Lambda = .65$, $F(8, 29) = 1.88$, $P = .09$, $\eta^2 = .35$, $\eta^2_{adj} = .19$. However, while this test did not produce a statistically significant result, it did reveal a notable effect size ($\eta^2_{adj} = .19$) which signaled that a relationship did exist to some degree between the SEMCD-6 variable and the outcomes variables of interest, thereby helping to reduce the error variance in the model and increase statistical power.

Hypothesis Testing

The following hypotheses were tested during the quantitative aspect of this mixed methods study.

> *Hypothesis # 3: Patients exposed to targeted DVD segments (Treatment 1) will outperform patients exposed to the educational Pamphlet (Treatment 2) on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL.* For hypothesis 1 (contrast 1), the observed differences in the adjusted mean vectors of the outcome variables were statistically significant among the DVD and Pamphlet groups on the outcome variable vectors tested, $\Lambda = .42$, $F(8, 29) = 4.97$, $p = .001$, $\eta^2_{\mathrm{adj}} = .48$. Table 21 presents the vector of adjusted mean differences between the DVD and Pamphlet groups.

Table 21

Vector of adjusted mean differences between DVD and Pamphlet

Outcome variable	Adjusted mean differences
SOLQ	
Physical	19.44
Emotional	13.35
Coping	6.3
Treatment Satisfaction	12.4
LINQ-TOTAL	0.24
SEMCD-6	2.05
EQ-5D	0.1
EQ-VAS	21.95

Upon examining the structure coefficients between each dependent variable and canonical variable of this contrast effect, it was determined that the SEMCD-6 (raw discriminant function coefficient = -.61, r^2_s = .14), SOLQ-Physical Function (raw discriminant function coefficient = .03, r^2_s = .13), and EQ-VAS (raw discriminant function coefficient = -.02, r^2_s = .10) outcome variables contributed most to the resultant function. While the raw discriminant function coefficients of the physical functioning subscale of the SOLQ (i.e., .03) and the EQ-VAS (i.e., -.02) would seem to indicate non-contribution to the latent function, it is important to recognize that function coefficients are influenced by correlations between the outcome variables. Therefore, it is important to primarily consult the structure coefficients for the outcome variables (Thompson & Borello, 1985). The physical functioning subscale of the SOLQ and the EQ-VAS possessed similar r^2_ss to that of the SEMCD-6, thus should be considered when interpreting the makeup of the function.

These results indicate that COPD self-management self-efficacy is the primary construct maximizing the differences between the two groups, while generic HRQoL and the physical functioning dimension of lung-specific HRQoL are also important constructs maximizing the group differences. Table 22 presents the DVD and Pamphlet group adjusted mean centroids for the three primary outcome variables defining the function.

Table 22

Group adjusted mean centroids for DVD and Pamphlet groups

Outcome variable	DVD	Pamphlet
SOLQ- *Physical*	39.37	19.93
EQ-VAS	45.20	67.15
SEMCD-6	5.09	7.15

The group adjusted mean centroids suggest that providing this sample with DVDs as opposed to Pamphlets was more beneficial in helping to improve lung-specific physical functioning among COPD patients, while Pamphlets were more effective in increasing self-reported generic opinions of HRQoL. In regards to COPD self-management self-efficacy, those in the Pamphlet group reported higher self-efficacy than those in the DVD group. These results support the hypothesis as it relates to the physical functioning dimension of HRQoL outcome, but does not support the hypothesis with regard to generic HRQoL, COPD self-management self-efficacy and COPD information needs.

Hypothesis # 4: Patients exposed to the targeted DVD and educational Pamphlet (Treatment 3) concurrently will underperform as compared to patients exposed to the DVD (Treatment 1) and educational Pamphlet alone (Treatment 2), on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL. For hypothesis 2 (contrast 2), the observed differences in the adjusted mean vectors of the outcome variables were statistically significant among participants exposed to both interventions concurrently (DVD + Pamphlet) versus participants exposed to either the DVD or Pamphlet exclusively, $\Lambda = .30$, $F(8, 29) = 8.35$, $p < .001$, $\eta^2_{adj} = .63$. Table 23 presents the vector of adjusted mean differences between the DVD + Pamphlet group and the collapsed average of the DVD and Pamphlet group adjusted mean centroids considered together.

Upon examining the structure coefficients between each dependent variable and canonical variable of the contrast effect, it was determined that the SEMCD-6 (raw discriminant function coefficient = -.87, $r^2_s = .23$), EQ-5D (raw discriminant function coefficient = .02, $r^2_s = .19$), and SOLQ-Coping (raw discriminant function coefficient = .02, $r^2_s = .10$) outcome variables contributed most to the resultant function.

Again, while the raw discriminant function coefficient of the EQ-5D (i.e., .02) and coping subscale of the SOLQ (i.e., .02) was very low, the squared structure coefficients describing their relationships with the canonical variables are noteworthy. Given that the coping skills subscale is highly correlated ($r = 0.93$) with another commonly used measure of self-efficacy in COPD patients (cf. Tu et al., 1997; Wigal et al., 1991), these two outcome variables (SEMCD-6 and SOLQ-Coping) can be conceptually put together to define COPD self-management self-efficacy as the construct that best describes the latent function which underlies this contrast effect.

Since the SEMCD-6 performed better than the coping subscale of the SOLQ maximizing the differences between the two groups (i.e., DVD + Pamphlet versus the collapsed average of the DVD and Pamphlet group adjusted mean centroids considered together), all COPD self-management self-efficacy data interpretations focused on SEMCD-6 scale results.

Table 23

Vector of adjusted mean differences between DVD + Pamphlet and average of the DVD and Pamphlet groups collapsed together

Outcome variable	Adjusted mean differences
SOLQ	
Physical	5.69
Emotional	11.12
Coping	19.68
Treatment Satisfaction	6.73
LINQ-TOTAL	2.39
SEMCD-6	2.77
EQ-5D	0.3
EQ-VAS	7.75

The EQ-5D variable is an indexed value that weights 5 dimensions of generic HRQoL into an indexed value from 0 to 1. It also contributed substantially to the latent function underlying the contrast effect. Table 24 presents the DVD + Pamphlet and the average of the DVD and Pamphlet group adjusted mean centroids for the SEMCD-6 and EQ-5D.

Table 24

Group adjusted mean centroids for DVD + Pamphlet and the average of the DVD and Pamphlet groups collapsed together

Outcome variable	DVD + Pamphlet	Average of DVD and Pamphlet groups
SEMCD-6	3.35	6.13
EQ-5D	.78	.48

In regards to COPD self-management self-efficacy, this result suggests that providing this sample with either a DVD or Pamphlet alone was more beneficial than providing participants with both interventions concurrently. Furthermore, taking into account results from contrast one, the participants in the Pamphlet group self-reported the highest levels of COPD self-management self-efficacy. In regards to self-reported generic HRQoL; however, this result suggests that providing this sample with either a DVD or Pamphlet alone was less beneficial than providing participants with both interventions concurrently. In sum, the results from contrast analysis 2 supports the hypothesis regarding the superior effect of the individual (i.e., Pamphlet primarily) versus the concurrent intervention strategies on COPD self-management self-efficacy, but does not support the hypothesis in regards to generic HRQoL; the concurrent educational strategy was actually associated with a more beneficial impact on generic HRQoL. Table 25 summarizes the statistically significant results from both contrasts 1 and 2.

While COPD self-management self-efficacy and generic HRQoL represented this contrast effect, the a priori hypothesis was not supported as regards the other outcome variable considered (i.e., COPD information needs), as there were no noteworthy structure coefficients linked to the variable describing this construct.

Hypothesis # 5: Patients exposed to targeted DVD segments (Treatment 1), educational Pamphlets (Treatment 2), and both DVD segments and educational Pamphlet concurrently (Treatment 3) will outperform patients exposed to the usual care (control) condition (Treatment 4) on outcome variables related to COPD informational needs, COPD self-management self-efficacy, and HRQoL.

For hypothesis 3 (contrast 3), the observed differences in the adjusted mean vectors of the outcome variables were not statistically significant among participants exposed to the DVD, Pamphlet, and/or both interventions concurrently (DVD + Pamphlet) versus participants exposed to usual care (Control), $\Lambda = .730$, $F(8, 29) = 1.34$, $p = .265$.

Table 25

Statistically significant test results for contrast analyses 1 and 2

Effect	r^2_s	Std. weight	Wilks's Λ	*F*	*p* & $\eta^2 adj$
DVD vs. Pamphlet					
SOLQ-Physical	**.13**	**.03**	.42	4.97	*p* = .001, η^2_{adj} = .48
SOLQ-Emotion	.05	.04			
SOLQ-Coping	.01	.02			
SOLQ-Satisfaction	.03	-.03			
LINQ-TOTAL	.0001	-.10			
SEMCD-6	**.14**	**-.62**			
EQ-VAS	**.10**	**-.02**			
EQ-5D	.03	.14			
DVD + Pamphlet vs. the average of DVD and Pamphlet groups together					
SOLQ-Physical	.002	.01	.30	8.35	*p* < .001, η^2_{adj} = .63
SOLQ-Emotion	.03	.05			
SOLQ-Coping	**.10**	**.02**			
SOLQ-Satisfaction	.01	.008			
LINQ-TOTAL	.02	.008			
SEMCD-6	**.23**	**-.87**			
EQ-VAS	.02	.01			
EQ-5D	**.19**	**.02**			

Because no functions were statistically significant at the .02 alpha level, the structure coefficients between each dependent variable and canonical variable were not examined. Furthermore, the hypothesis that the provision of self-management education versus usual care would statistically significantly decrease COPD informational needs, and increase COPD self-management self-efficacy and generic/lung-specific HRQoL, was not supported by the data.

Summary

Most participants received and reviewed the educational material that was sent to them and perceived these instructional materials as useful and relatively easy to understand.

When comparing the adjusted mean vectors of the DVD versus the Pamphlet group participants on the outcome variables of interest, there were statistically significant differences found relative to the COPD self-management self-efficacy, lung-specific HRQoL (i.e., physical functioning dimension), and generic HRQoL constructs. The Pamphlet group participants reported higher levels of self-efficacy than the DVD group participants; whereas, the DVD group participants reported higher levels of physical functioning (i.e., lung-specific HRQoL measure) than the Pamphlet group. Interestingly, the participants in the Pamphlet group self-reported greater generic HRQoL than did participants in the DVD group.

When comparing the adjusted mean vectors of the DVD + Pamphlet group versus the collapsed average of the DVD and Pamphlet group participants on the outcome variables of interest, there were statistically significant differences found relative to the COPD self-management self-efficacy and generic HRQoL outcome measures. The results suggested that, in order to increase COPD self-management self-efficacy, providing this sample with a Pamphlet alone was more effective than providing participants with both educational interventions concurrently. In contrast, providing patients with both educational interventions concurrently was associated with greater self-reported generic HRQoL as compared to providing participants each intervention individually.

When comparing the adjusted mean vectors of the DVD, Pamphlet, and/or both interventions concurrently (DVD + Pamphlet) versus participants exposed to the usual care control group, there were no statistically significant differences found relative to the outcome variables of interest. Thus, the provision of any type of educational material as opposed to usual care did not improve the results on the outcome variables of interest among this sample of COPD patients.

Finally, across all three planned contrasts tested, there was no statistically significant effect of self-management education, in any format or combination, on COPD information needs.

CHAPTER V

DISCUSSION AND CONCLUSION

Introduction

Because of limited access to hospital-based pulmonary rehabilitation for underserved patients, COPD self-management education programs have been designed, implemented, and evaluated in order to help improve the overall management of COPD. The self-management model emphasizes mastery of self-regulatory skills such as self-monitoring health-related behavior and its socio-cognitive precepts. Effective programs geared towards COPD self-management include components such as: (a) provision of information, (b) translating information into preventive action, and (c) self-efficacy building. The evaluations of the effectiveness of self-management programs can identify the true effective educational elements for successful COPD self-management, and thus facilitate the acquisition of self-management skills and behavior change.

Given that (a) previous research noted a lack of patient-centered interventions which took into account patient perspectives and knowledge of disease management by way of a needs assessment (Woo et al., 2006) and (b) COPD patients have reported widespread dissatisfaction with the self-management education they are provided (Barr et al., 2005; Elkington & White, 2002; Gore, Brophy, & Greenstoe, 2000; Jones, Hyland, Hanney, & Erwin, 2004), this particular study collected and utilized data from qualitative focus groups to assess the self-management learning needs and perspectives of COPD patients in order to inform the development of a targeted self-management educational DVD developed in accordance with patients' specific COPD self-management needs. Participants represented a sample of underserved patients living in a rural community, and not enrolled in formal pulmonary rehabilitation programs due to geographic barriers and monetary costs associated with such programs. Consequently, these patients were ideal candidates for receiving COPD self-management education interventions.

The DVD modality was chosen as one format to transmit COPD self-management education, because research has shown that older COPD patients appreciate and learn well from home-based self-management educational programs that make use of audiovisual media (Boxall, Hons, Sayers, & Caplan, 2006; Constantinidou & Baker, 2002; Finklestein & Ratner, 2006; Nguyen et al., 2003; Petty et al., 2006). In addition, most patients in this rural sample indicated that they had access to a DVD player when initially interviewed by a project assistant. It was posited that targeted, audio-visual education would best aid patients in their self-management of COPD through building self-efficacy for self-managing disease, reducing the need for disease-related information, and improving self-reported HRQoL. COPD self-management education programs can help enhance patients' self-efficacy through transmitting information that address these four sources of efficacy information. It has been argued that the effects of a self-management education program on HRQoL results from behavior change that is caused by enhanced self-efficacy, skill building and a reduced need for self-management information.

In light of this, the quantitative aspect of this study assessed the effectiveness of three distinct educational treatments (including the newly developed one) by comparing outcomes related to (a) COPD informational needs, (b) COPD self-management self-efficacy, and (c) generic and lung-specific HRQoL in a randomly-assigned, multiple-group pretest-posttest design with a control group.

The primary aim of the present study was to measure and specifically compare the effect of three COPD self-management education dissemination strategies (and a control strategy) on relative differences in generic and disease-specific HRQoL, COPD information needs and COPD self-management self-efficacy. The four educational treatments were:

1. Targeted RVision™ DVD segments (RVision™ Corporation, 2007)
2. Pre-produced written Pamphlet, *Breathing Better With a COPD Diagnosis* (National Heart, Lung and Blood Institute, 2007b)
3. Targeted RVision™ DVD segments and *Breathing Better With a COPD Diagnosis*
4. Usual care (control)

The secondary aim of the present study was to assess the self-management learning needs, experiences and perspectives of COPD patients who were treated at Choctaw Urgent Care, a Certified Federal Rural Health Clinic in rural Butler, Alabama. This was undertaken to inform the development of the edited DVD.

Conclusions

Qualitative

The main theme articulated by focus group members coincided with the predominant theme identified by Cicutto et al. (2004). Focus group participants spoke about trying to perform basic daily tasks while trying to manage symptoms caused by COPD. The three main sub-themes deductively identified in the present focus group data were: (a) adjusting physically to COPD, (b) adjusting physically to COPD self-management activities, and (c) adjusting emotionally to COPD self-management. Specifically, patients discussed their need to reduce the amount of movement that they engaged in from day to day. In particular, low intensity physical activity, involving a minimal amount of movement, was noted to be especially difficult. There was one sub-theme which emerged inductively from the data analysis and was characterized as coming to terms with COPD and the lifestyle. This sub-theme was related to how/if patients rationalized their COPD diagnosis and also how they described the lifestyle prompted by their diagnosis.

Patients also discussed a lack of knowledge regarding COPD self-management behavior modification strategies. Participants frequently discussed staying sedentary for fear that moving would cause breathlessness. The lack of COPD self-management implementation suggested that the participants' current lifestyles were not conducive to limiting dyspnea exacerbations, as this type of activity can cause further deconditioning which can aggravate dyspnea even further (Reardon, Lareau, & ZuWallack, 2006). Moreover, the self-management experiences of COPD patients in these focus groups were limited to only reducing movement and activity and taking prescribed medications. The participants professed an interest, however, in receiving any knowledge regarding other strategies that could help limit the onset of dyspnea exacerbations.

Further, focus group participants did not realize the importance of practicing other COPD self-management skills and behaviors, such as practicing breathing exercises. This emergent finding contradicted what was hypothesized, as patients reported a lack of knowledge and skill development related to controlled breathing and coughing, stress reduction, paced walking and planned movement. These, and other related topics, were included on the edited DVD provided to selected participants. The paired down list of COPD self-management topics identified as useful for this priority population (i.e., underserved rural patients) provides a basis for future audiovisual editing efforts geared towards this audience. Furthermore, the utilization of qualitative data collection techniques to inform the development of self-management DVDs could benefit from using qualitative data analysis techniques which provide quantitative insight into the most prevalent self-management topics expressed during focus groups.

Quantitative

Most participants (almost 90%) reported receiving and reviewing the self-management education material that was sent to them via regular mail. Thus, the distribution strategy for the intervention materials proved to be quite effective. It is important to be cognizant, however, of response bias which may have been present among a sample receiving remuneration for their active participation in a study. Nonetheless, it was encouraging to note that participants found the educational materials to be useful and relatively easy to understand. Although the participants self-reported positive impressions of the educational materials, the three treatment groups did not differ to a statistically significantly degree. Thus, it is inconclusive as to which treatment was most easily utilized and understood among this unique group of rural COPD patients.

There were statistically significant differences found on the COPD self-management self-efficacy, lung-specific HRQoL (physical functioning dimension), and generic HRQoL outcome variables across 2 of the 3 contrast analyses.

While it was hypothesized that participants in the DVD group would outperform participants in the Pamphlet group on all outcome variables tested, the Pamphlet group participants reported higher levels of self-efficacy than did the DVD group participants. Moreover, findings from contrast 1 suggest that of the two types of self-management education interventions tested, text based self-management education may be more effective to enhance COPD self-management self-efficacy in a population similar to the sample in this study. A few studies noted improvements in self-management self-efficacy after exposure to self-management education (Atkins et al., 1984; Kara & Asti, 2004; Scherer & Schmieder, 1997; Tsang, 2000; Zimmerman, Brown, & Bowman, 1996), yet these studies, for the most part, only found within-group improvement in self-efficacy among patients exposed to group self-management education as opposed to usual care. Studies of this nature did not investigate between group differences among participants exposed to different types of educational treatments as the present study did. The present research supported different between-group effects of different COPD self-management educational strategies on COPD self-management self-efficacy. Moreover, this study was the first to specifically identifying Pamphlet distribution alone as the most effective educational strategy to positively influence COPD self-management self-efficacy among COPD patients.

In a systematic review of the effectiveness of COPD self-management education, a positive trend was observed indicating that education had a positive impact on HRQoL (Effing et al., 2007). This overarching finding was somewhat supported within the present study when comparing the effect of different self-management educational strategies on both generic and lung-specific HRQoL. The DVD group participants improved more so than the Pamphlet group in regards to physically functioning with COPD. The DVD group participants did not, however, outperform the participants in the Pamphlet group on one measure of generic HRQoL. Thus, in regards to the physical functioning dimension of lung-specific HRQoL, the data supported the hypothesis posed, yet the finding related to generic HRQoL contradicted the a priori hypothesis.

Of note is the improvement on the physical functioning subscale of the SOLQ for participants in the DVD group. DVD group participants reported clinically significant improvements in physical and emotional functioning (i.e., an improvement of 5 points, see Tu et al., 1997). The same could not be said for the Pamphlet and Control groups. Exposure to standard self-management education had previously been associated with improvements in physical functioning, but did not reach a level of clinical significance in all previous studies (Effing et al., 2007; Kara & Asti, 2004; Soler et al., 2006). Thus, the clinically significant improvement in physical and emotional functioning linked with exposure to the targeted self-management DVD represents an important finding. The present study supports the idea that exposure to audio-visual based education, as opposed to text based education, can clinically impact physical and emotional functioning among COPD patients (Petty et al., 2006).

It is important to note, however, that the above finding cannot be said in regards to generic HRQoL (i.e., HRQoL not specifically associated with a disease), as the data from this study did not support increased efficacy of the DVD as opposed to the Pamphlet in relation to this more general construct. Furthermore, this study suggests there are differential effects of educational treatment on both generic and disease-specific HRQoL among COPD patients. When specifically comparing the DVD and Pamphlet groups' results on the HRQoL outcome variable, it was determined that the influence of how HRQoL was measured (i.e., generically versus disease-specifically) had a disparate impact on result interpretation, with the dimensional measurement concluding that the DVD education produced superior effects on physical functioning, while the Pamphlet produced superior effects when generic HRQoL was assessed.

Generic measures of HRQoL have generally been reported as weak among COPD patients (Guyatt et al, 1999; Tsukino et al., 2002) and more likely to detect effects unrelated to COPD (Curtis & Patrick, 2003). Furthermore, in most studies, but not all (Tsukino et al., 2002), disease-specific instruments have been more responsive to change (Puhan et al., 2007). It is important to note, however, that the more the content of an instrument deviates from the concept under study, the greater the error introduced and the lesser the accuracy of inferences (Hajiro, Nishimura, Tsukino, Toru, & Takateru, 1999). Thus, the results interpreted from the data collected using the COPD-specific instrument may be the most accurate for data interpretation purposes. Moreover, the positive effect of the DVD on disease-specific HRQoL (i.e., physical functioning dimension) may be the more important finding.

When comparing the adjusted mean vectors of the DVD + Pamphlet group versus the collapsed average of the DVD and Pamphlet group participants, there were statistically significant differences found on the COPD self-management self-efficacy outcome measure as well as a measure of generic HRQoL. The results suggested that providing this sample with either a DVD or Pamphlet alone was more effective than providing participants with both interventions concurrently in order to increase COPD self-management self-efficacy. This finding regarding COPD self-management self-efficacy was notable and supported the hypothesis stating that both treatments concurrently would be less effective than distributing only one of the two instructional materials to patients. Further, this result concurs with CIPT (Rudd & Glanz, 1990), which emphasizes that health consumers can process and use only a limited amount of information at one time (Bettman, 1979). This result also builds upon the previous findings in contrast 1, suggesting again that the distribution of Pamphlets alone s the superior strategy to enhance COPD self-management self-efficacy among a rural sample of COPD patients.

In light of these results regarding the effects of COPD self-management on self-efficacy, perhaps providing patients with too much information in different formats caused an “information overload” for participants and did not allow participants to ascertain the information needed to enhance their efficacy beliefs. These findings suggest that a “less is more” phenomena may be present and supports a singular educational strategy to enhance self-efficacy among COPD patients, which has been primarily studied in the literature (Kara & Asti, 2004; Tsang, 2000). Patients may respond better to consistent messages regarding COPD self-management and efforts aimed at reducing the potential for contradiction and/or confusion regarding the various self-management skills and behaviors included within self-management educational material. As well, most educational interventions designed to enhance COPD self-management education should usually be supplemented by other support interpersonal support from family, peer, health professionals, etc., and not simply by way of information dissemination. These possibilities should be considered during the educational planning process, as text-based educational materials may or may not be the sole resource of choice for populations such as the one in the current study.

The test of the above contrast effect also revealed that the provision of concurrent educational interventions was associated with enhanced generic HRQoL, thus refuting the a priori hypothesis in regards to this outcome variable. Thus, the application of different education strategies (e.g., DVD vs. Pamphlet vs. DVD + Pamphlet) possibly should be considered depending on which health-related outcome is of interest to the practitioner (i.e. increased self-management self-efficacy or enhanced HRQoL). This result also builds upon the previous findings in contrast 1, illustrating that patient exposure to an educational intervention including a DVD positively influences generic HRQoL. Further, generic HRQoL was statistically significantly higher in contrast one when patients were exposed to a Pamphlet alone (versus a DVD); whereas, in contrast 2, generic HRQoL was statistically significantly higher when patients were exposed to both treatments concurrently. The data suggests that the DVD may serve as a useful educational supplement for the Pamphlet in order to enhance generic HRQoL.

When comparing the average adjusted mean vectors collapsed across the DVD, Pamphlet, and DVD + Pamphlet groups versus the adjusted mean vectors of participants exposed to the usual care control group, there were no statistically significant differences found relative to any of the outcome variables of interest. Stated differently, the provision of self-management education material as opposed to usual care did not improve the outcome variables of interest among this sample of COPD patients. This finding contradicts the hypothesis that self-management education would be more effective than usual care in regards to affecting the outcomes variables tested during this study. Furthermore, this particular finding questions the efficacy of self-management education (as opposed to usual care) in helping patients enhance their self-efficacy for COPD self-management, reduce their informational needs related to COPD, and improve their HRQoL.

There are potential confounding influences, however, especially an insufficient sample size, which may have contributed to this lack of contrast effect. It is also important to note that patients with Stage I (mild) COPD are more likely to report high levels of HRQoL; thus, self-management may have little impact on the overall well-being of patients (i.e., given that there is little room for improvement). Researchers and practitioners should not be all that surprised when self-management education interventions do not impact patients with Stage I COPD, as they may be experiencing very little disease-related disability (Boubeau, 2004; Worth & Dhein, 2004). Given that disease stage was not utilized as an independent variable in this study, it cannot be determined whether this stage effect may have impacted the results of this contrast analysis.

The final conclusion of note is that there were no statistically significant findings related to COPD information needs. Across all three planned contrasts tested, there was little effect of self-management education on this dependent variable. These results suggest that self-management education has little effect on patients' self-reported need for information related to COPD self-management. This contradicted the anticipated finding which was based on the formative focus group interviews, which suggested a positive impact was possible.

Limitations

This study had several limitations. One such limitation was the lack of generalizability which can be generated from the study's results. This is primarily due to the social characteristics of the community which may have influenced the small sample sizes for both aspects of the study, especially the quantitative facet. For example, in the quantitative study, the number of participants (n = 41) was lacking, in part, due to the size of the town where the research was being conducted, which also impacted the less than optimal response rates. Potential reasons for less than anticipated response rates include: a shift to more of a distance versus on-site educational dissemination approach, an unwillingness of patients to acknowledge their disease status, and the difficulties coordinating an off-site project of this nature. Despite extensive efforts to recruit patients, this limitation proved evident, especially when considering the non-statistically significant effects of contrast 3, which compared all modes of self-management education versus usual care.

A post-hoc power analysis was conducted using G*POWER™ software (Erdfelder, Faul, & Buchner, 1996) to determine the power that was available to detect statistically significant differences in the outcome variables given the relatively low number of participants in this study. The average effect size imputed to conduct this post-hoc power analysis was .15, as this figure reflected the average of the statistically significant effect size measures (r^2_s) found within contrasts 1 and 2. The α level entered was .02 to account for the bonferroni-corrected value reflecting the 3 orthogonal, nontrend planned contrasts which were tested. The sample size was the total sample size in the study (n = 41), while 4 treatment groups (including the control group) and 8 dependent variables were also input. The result of this post-hoc power analysis indicated that power to detect statistically significant findings in this study was extremely low at .43. This low power estimate was most likely a primary reason that statistically significant findings were not found when analyzing the effects of contrast 3.

An increase of approximately 26 participants would have resulted in more sufficient power (i.e., .80) to detect statistically significant differences when examining contrast 3 effects. In light of this, the low number of participants of this study was a clear limitation and had an impact on the findings. Studies with more participants can generate more statistical power to detect statistically significant differences in outcomes, and are very necessary (Rabe et al., 2007). Larger samples of COPD patients from multiple rural health centers would be extremely beneficial. Making use of rural health networks would be ideal to implement research endeavors such as the one attempted. Additionally, cross-sectional applications of a modified form of this research design and protocol could greatly augment the current understanding of the effectiveness of COPD self-management education in rural, underserved areas. Also, it would be important to attempt to repeat such research projects with an even more diverse population group of COPD patients to ensure adequate representation from those afflicted with COPD.

When working with rural, underserved communities, where community input is so crucial to the success of program implementation, it is vitally important to allocate the time and establish the collaborations and networks necessary to facilitate a strong community rapport. This includes a comprehensive needs assessment process, which emphasizes community involvement at the individual, community, institutional, and public policy levels. Such processes are described thoroughly within commonly used models operationalized within health education circles (e.g., community-based participatory research protocols, health education program planning models, social ecological models, etc.). Relationship building takes time (which was limited due to a relatively fixed dissertation project period), effort and networking with prominent liaisons associated with the public health community, and overall community, one is working in. It should be noted that the principal investigator actively attempted to establish such an alliance with the Choctaw County health department to help create community support, but was unable to do so despite numerous phone calls and emails to these officials. In hindsight, it would have most likely been more beneficial to contact multiple institutions within the community as opposed to focusing exclusively officials charged primarily with ensuring the health of the local community. Community institutions such as churches or other faith based organizations, senior centers, and other civic establishments catering primarily to an older demographic should have been contacted and notified about this project. This action could have increased the probability of (a) attracting more patient participation and (b) establishing more community support for this particular self-management education initiative.

The validity of the participants' self-reported self-management behaviors was another concern in this study. In this research, self-report could have biased the data through participants' intentional or unintentional misrepresentation of their behaviors. Another possible limitation was reactivity (i.e., an individual may reduce or alter their behaviors in reaction to the daily monitoring of self-management). Possible other threats to internal validity included: unintended contamination among individuals within different treatment groups, diffusion of educational treatments among participants in disparate treatment groups, differential disease status maturation effects and selection bias robust against randomization and statistical adjustment. It is important to note that the effects of baseline pretest covariates were taken into account to reduce these threats to internal validity; however, while steps were taken to avoid such threats, they were nevertheless present.

Differential participant dropout was also a concern given the multi-treatment nature of the study design, which resulted in an unequal number of participants in each treatment group. Unfortunately, there was limited information available regarding reasons why participants could or did not complete the study, although some reasons can be inferred from the previous discussion of the qualitative findings (i.e., rejecting or not succumbing to the diagnosis). Some of these limitations were lessened by using a control group in the design, however.

It is important to acknowledge, at this point, that improving knowledge, although necessary, is an insufficient sole outcome of a chronic disease self-management program and does not always lead to self-management behavior. Furthermore, health educators who work in chronic disease self-management should, “ensure that patients acquire the confidence and specific skills to manage their disease on a daily basis” (Bourbeau & Nault, 2007, p. 623). Building individual self-efficacy among patients at the individual level can and should be supplemented on multiple levels, including the interpersonal (e.g., support from family and friends), community (e.g., encouragement from church groups and other civic minded organizations), institution (e.g., active involvement of health care personnel such as those working for home health agencies), and policy (e.g., ensuring that funding is available to provide underserved rural patients with the proper educational materials they need) levels (McLeroy, Bibeau, Steckler, & Glanz, 1988).

Furthermore, successful COPD self-management education involves *both* the transfer of knowledge *as well as* patient acquisition of certain important behavioral skills. This behavior change outcome can many times not be attained through simply cognitive-based interventions. It is important to note this health education truism and take heed to the marked increase in the amount of behaviorally-oriented research studies related to COPD self-management (Bourbeau, 2003; Coultas et al., 2005; Monninkhof et al., 2003a; Rea et al., 2004). More ecologically based studies should supplement work of this cognitive nature, given that this research project relied exclusively on self-management education to produce positive health-related outcomes, without fully complementing these planned learning experiences by taking into account the relative and contextual elements within the population. Further, Bourbeau and Nault (2007) emphasize best practice COPD self-management recommendations to include actual interactions between learners and educators and providing education exclusively based on individual learning styles. These interactions and practices did not take place in this particular study and may have limited the effectiveness of the overall intervention itself.

Recommendations for Future Research

Future research would benefit from identifying more comprehensive qualitative research protocols for collecting data designed to inform the development of COPD self-management education resources. While the present qualitative data was extensively analyzed, it was only rudimentarily translated into the development of a COPD self-management DVD tool. No precise guidelines existed or were implemented to systematically assess the most important self-management topics to target and include on the edited DVD. Further, the needs assessment process for educational technology development as it relates to COPD self-management is an important area for future research and development.

Additionally, within the qualitative study, the information obtained during the focus group interviews may not have been sufficient to guide the editing of the library of COPD self-management DVDs. Formative qualitative research designed to inform the development of COPD self-management education material may benefit from an alternative research protocol. Perhaps providing participants with the entire collection of DVD segments and having them view these segments before the focus groups would be best practice. This would allow patients to have more input as to what information should be included within the instructional material. In addition, this collaborative editing process could produce more targeted education. Using this approach would also help identify a translational process that could streamline the editing process using qualitative data. Moreover, future research could benefit from systematically outlining procedures that empirically identify the most important self-management topics to include within educational materials based on more active participation from COPD patients.

More quantitative studies are needed to build the COPD self-management education research base and solidify its true effects on patients. Results from this study were able to identify differential effects of distinct instructional methods on a number of health outcomes related to COPD. These findings can add to the literature and help, "formulate (more) clear recommendations regarding the form and contents of self-management education programmes in COPD" (Effing et al., 2007, p. 2). The data and corresponding findings from this study, however, failed to show that COPD self-management education was superior to usual care. The overall effect of self-management education on pertinent COPD self-management outcomes versus usual care was not statistically significantly better. The current study reinforces the recommendations of Effing et al. in that, "there is an evident need for more large RCTs (randomized control trials) with a long-term follow-up, before more conclusions can be drawn" (p. 2). If COPD self-management education is proven to be effective, then the results from this study suggest that patients may respond to differently to different educational interventions, so it is important that an empirical evidence base is built which can identify optimal educational dissemination strategies for specific populations of COPD patients (e.g., COPD patients living in a rural community). The choice of dissemination strategy and instructional tools could prove crucial to overall programmatic success.

In light of different educational strategies revealing different effects on health related outcome variables (in the present study), more between group studies examining self-management education strategies are warranted. For example, more studies should be conducted examining the effects of COPD self-management education on both lung-specific and generic HRQoL to understand how each outcome is affected by different educational strategies and tools. Findings from previous studies looking at the effects of self-management education on generic versus lung-specific HRQoL have been inconsistent and inconclusive (Blake et al., 1990; Coultas et al., 2005; Emery et al., 1998; Littlejohns et al., 1991; Rea et al., 2004), thus resembling results obtained from the present study. Furthermore, the suggestion that both generic and disease specific measures of HRQoL be assessed in order to understand multiple functional outcomes of interventions (Curtis, Deyo, & Hudson, 1994) is all the more prudent for studies examining the effects of COPD self-management education.

In the same vein, there are relatively few empirical research studies examining the effects of self-management education on self-efficacy in COPD patients, even though this suggestion has been made in the literature (Effing et al., 2007). Therefore, more research should be conducted to confirm/disconfirm the beneficial effects of COPD self-management education on self-efficacy among COPD patients. Future research would benefit from assessing multiple levels of influence (e.g., ecological perspective), such as social support and community influence (McLeroy, Bibeau, Steckler, & Glanz, 1988) and examine how each uniquely impacts COPD self-management self-efficacy.

More multivariate studies should be conducted to examine the unique effects of self-management education on multiple health-related outcome measures. The present study utilized a multivariate perspective with a priori planned contrasts, a strategy not used in previous studies examining the effectiveness of COPD self-management education. Because multivariate contrasts were employed, experimentwise inflation of type I error was controlled and the probability of making a type II error was reduced, thus increasing the statistical power of the analysis. Even more important, the complexity of the COPD patient's reality was honored (Thompson, 1994), given that most COPD-related outcomes have multiple causes and most of these causes produce multiple effects. Furthermore, additional outcome measures should be examined in future COPD self-management education studies. Appropriate outcomes not assessed in the present study included: number and severity of shortness of breath exacerbations, courses of oral steroids of antibiotics, use of rescue medication, hospital admissions, emergency room visits, use of other health care facilities, days lost from work and exercise capacity (Effing et al., 2007). Examining the effects of self-management education on numerous outcome variables simultaneously could provide unique insight into how the format and content of COPD self-management affects these different outcome variables.

Finally, there was one quantitative research experience which seemed to corroborate the data gathered during the qualitative aspect of this mixed methods study. The researcher noted that a small subset of potential participants in this study were reluctant to participate due to an unwillingness to characterize themselves as being afflicted with COPD. While these patients met the physiological criteria for the disease, and were made aware of their diagnosis, some professed not believing that they suffered from the disease. These patients most likely were exhibiting a form of the "coming to terms with COPD and the lifestyle" theme that emerged inductively from the focus group data. Further, there was evidence during both parts of this study that some individuals go through a denial period after being told that they suffer from COPD. Perhaps this is because these patients are in the formative stages of disease progression and do not notice physiological deterioration. While this may be the case, it is important that future researchers ensure that all potential patients participating in COPD self-management education studies are aware, and have accepted, their diagnosis of COPD. This research practice can help to ensure the ethical recruitment and retention of COPD patients and optimally identify only those patients who are prepared to learn more about managing their condition.

Recommendations for Future Practice

This research contributes to the literature by specifically comparing the effect of different self-management education modalities and strategies on several disease-relevant outcome variables. While this research supports the need to further examine the efficacy of COPD self-management education, it provides practitioners with valuable information related to which types of educational treatments may best affect several, pertinent health outcomes. For example, the practitioner looking to enhance the self-efficacy of rural COPD patients may be best served to distribute Pamphlets to patients regarding the skills and behaviors necessary for self-managing COPD. Furthermore, to enhance self-efficacy for self-managing COPD in a low socioeconomic population, this research suggests there should be consideration given to the amount and type of educational materials given to patients.

The DVD modality may be best suited to instruct patients on the skills and behaviors necessary to enhance HRQoL either with or without the complement of written educational material. In this study, the concomitant combination of DVD and text-based education proved useful for enhancing the generic HRQoL of COPD patients. Unlike COPD self-management self-efficacy, the provision of more information as opposed to less may be beneficial in improving general HRQoL outcomes in COPD patients. If practitioners are charged with implementing COPD self-management education programs that are to be designed to limit shortness of breath and the extent to which dyspnea affects normal functioning, practitioners may benefit from providing patients with audio-visual education resources as opposed to traditional text based

Pamphlets. The audio-visual strategy (e.g., DVD) provides patients with vicarious self-management experiences as well as displaying actors suffering from and managing the same breathing difficulties that the patients face (e.g., shortness of breath exacerbations). Another benefit of using DVDs to educate patients is that it simulates actual instruction and persuasive directives that could be given face-to-face by a health service provider, but it does so in a portable, segmented format, which can be easily disseminated to patients for viewing in the comfort and convenience of their own residence. If rural patients have access to technologies which support this educational technology, then the DVD could prove very useful in providing information which can limit dyspnea exacerbations and reduce the need for costly emergency room visits.

When working in rural, underserved populations, where patients live in wide-ranging geographical areas, the educational distribution strategy for instructional materials is an important consideration. Given that COPD patients are usually older and physically debilitated, it is important to recognize that the efficient dissemination of COPD self-management education may prove crucial to the acquisition of skills and behaviors necessary to effectively manage COPD. Within the present study, the educational distribution strategies and data collection processes (i.e., for the quantitative aspect of the study) using regular mail were relatively efficient and might be useful for other practitioners working with COPD patients in rural areas. Also, older adults living in rural areas may be limited in their ability to travel to and from medical facilities and/or health centers on a regular basis. Therefore, home-based educational resources provided to patients in a format they desire could prove ideal when working in rural communities.

In terms of consulting this work for practice based guidelines, it is important to reiterate that there existed a limited sampling pool in this small rural community, and the response rate from potential patients greatly limits the external validity of these findings. There also exists important physiological differences among patients as COPD progresses, thus disease stage is an important variable to assess when working with patients. In this study, this particular information was not made available and could not be accounted for when assessing the qualitative or quantitative data. Finally, the aforementioned practice recommendations are predicated on the tenuous assumption that future research with larger sampling pools of rural patients will reveal positive effects resulting from the provision of self-management education. While it may be very likely that different COPD self-management educational strategies causally produce different effects on relevant COPD patient health outcomes, the overall effectiveness of COPD self-management education as it relates to improving patient knowledge, behavior-oriented skills, self-management self-efficacy and HRQoL is still in question. Without more research providing additional evidence to support to utility of COPD self-management education versus usual care, the efficacy of COPD self-management education can not be fully supported.

In sum, if the medical care model shifts from emphasizing institutional diagnosis of treatment and ongoing care (which proves quite costly), to stressing more personal responsibility for both, we may see more integration of self-management education into out health care system. This shift should not require a new breed of health professionals, but rather a reconfiguration of the health care delivery system, which allows for more prevention and disease management incorporation (Bourbeau & Nault, 2007). If and when this shift takes place, it will be very important to determine: (a) the process used to transmit education; (b) the format used during the instructional process; and (c) the content to be included within the instruction. Bourbeau and Nault (2007) suggest that the development of patient centered self-management education programs requires four main planning requirements: (a) interactions between the learners and educators will occur; (b) education is based on the learning styles and needs of patients and provided in a format highly conducive to behavioral response; (c) mastery of self-management skills is placed at a premium; and (d) evaluation of patient outcomes is completed. It is important to understand what patients know about their disease, what their concerns or problems are related to the disease, and which coping skills they are currently using to live with the disease (Weston-Eborn & Sitzman, 2005). Moreover, educational topics of interest to the patients must be integrated into instructional sessions, and these sessions should be weaved into an educational process that supports the natural diffusion of pertinent information. Thus, the practitioner is encouraged to use a variety of educational methods to disseminate information, as multiple methods are more likely to ensure information retention (Nault et al., 2002).

Summary

The efficacy of COPD self-management education transmitted through a DVD proved effective in helping rural patients function better physically with their disease as compared to patients provided with a text-based Pamphlet. However, patients provided with a DVD did not report better generic HRQoL as compared to participants receiving a Pamphlet alone. When both educational interventions (DVD + Pamphlet) were provided to patients concurrently (as opposed to receiving each intervention individually), there was a marked improvement in patients’ generic HRQoL. In addition, patients provided with Pamphlets revealed greater improvements in COPD self-management self-efficacy than did patients who received the DVD. Finally, providing patients with any type or combination of COPD self-management education (i.e., including the DVD and Pamphlet) showed no statistically significant improvements on the outcome variables considered together as compared to patients provided with usual care. In sum, the results from this study suggest that COPD self-management DVDs can be effective in helping patients experience better physical functioning (a lung-specific HRQoL measure), and, in conjunction with text-based Pamphlets, can improve generic HRQoL in rural COPD patients more so than exposure to text-based Pamphlets alone. Practitioners should use caution, however, when attempting to generalize the findings from this study given the small sample sizes within this mixed methods study.

REFERENCES

Aaron, S. D., Vandemheen, D. Fergusson, F., Maltais, F., Bourbeau, J., Goldstein, R., et al. (2007). Tiotropium in combination with placebo, salmeterol, or fluticasone–salmeterol for treatment of chronic obstructive pulmonary disease: A randomized trial. *Annals of Internal Medicine, 146*, 545-555.

Adams, S. G., Smith, P. K., Allan, P. F., Anzueto, A., Pugh, J. A., & Cornell, J. E. (2007). Systematic review of the chronic care model in chronic obstructive pulmonary disease prevention and management. *Archives of Internal Medicine, 167*, 551-561.

Agusti, A. G. (2005). Systemic effects of chronic obstructive pulmonary disease. *Proceedings of the American Thoracic Society, 2*, 367-370.

Alabama Medical Education Consortium, The. *The status of primary healthcare in Choctaw County, August 2006*. Retrieved November 13, 2007, from http://www.amec.uwa.edu/PDFFiles/CoPCStudies/CHOCTAW2006revised.pdf.

Alabama Rural Health Association. (2003). Selected indicators of rural health status in Alabama. *Alabama Rural Health Report, 3*, 1-18.

Alpha-1 Foundation. (2007). *What is Alpha1?* Retrieved October 22, 2007, from http://www.alphaone.org.

American Lung Association. (2007a). *Chronic obstructive pulmonary disease (COPD) fact sheet*. Retrieved October 28, 2007, from http://www.lungusa.org/site/apps/nl/content3.asp?c=dvLUK9O0E&b=2058829&content_id={EE451F66-996B-4C23-874D-BF66586196FF}&notoc=1.

American Lung Association. (2007b). *State of lung disease in diverse communities: 2007*. Retrieved on October 22, 2007, from http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=308853.

American Thoracic Society. (1990). *Quality of life resource: EQ-5D*. Retrieved on December 11, 2007, from http://www.atsqol.org/sections/instruments/ae/pages/eq5d.html.

American Thoracic Society. (1999). Pulmonary rehabilitation-1999. *American Journal of Respiratory Critical Care Medicine*, *159,* 1666-1682.

Andenaes, R., Moum, T., Kalfoss, M. H., & Wahl, A. K. (2006). Changes in health status, psychological distress, and quality of life in COPD patients after hospitalization. *Quality of Life Research, 15*, 249-257.

Anderson, A. (1991). Repeated measures: Groups x occasions designs. In P. Lovie & A. D. Lovie (Eds.). *New developments in statistics for psychology and the social sciences, vol. 2* (pp. 155-173). London: BPS & Routledge.

Andersson, F., Borg, S., Jansson, S. A., Jonsson, A. C., Ericsson, A., Prutz, C., et al. (2002). The costs of exacerbations in chronic obstructive pulmonary disease (COPD). *Respiratory Medicine, 96*, 700-708.

Anthonisen, N. R., Connett, J. E., Enright, P. L., Manfreda, J., & The Lung Health Study Research Group. (2002). Hospitalizations and mortality in the lung health study. *American Journal of Critical Care Medicine, 166*, 333-339.

Anthonisen, N. R., Connett, J. E., Kiley, J. P., Altose, M. D., Bailey, W. C., Buist, A. S., et al. (1994). Effects of smoking intervention and the use of an inhaled anticholinergic bronchodilator on the rate of decline of FEV_1: The lung health study. *Journal of the American Medical Association, 272*, 1497-1505.

Anto, J. M., Vermeire, P., Vestbo, J., & Sunyer, J. (2001). Epidemiology of chronic obstructive pulmonary disease. *European Respiratory Journal, 17*, 982-994.

Arcasoy, S. M., & Kotloff, R. M. (1999). Lung transplantation. *New England Journal of Medicine, 340*, 1081-1091.

Arnold, R., Ranchor, A. V., DeJongste, M. J. L., Koeter, J. H., Ten Hacken, N. H. T., Aalbers, R., et al. (2005). The relationship between self-efficacy and self-reported physical functioning in chronic obstructive pulmonary disease and chronic heart failure. *Behavioral Medicine*, *31*, 107-115.

Atkins, C. J., Kaplan, R. M., Timms, R. M., Reinsch, S., & Lofback, K. (1984). Behavioral exercise programs in the management of chronic obstructive pulmonary disease. *Journal of Consulting and Clinical Psychology, 52*, 591-603.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33*, 344-358.

Bandura, A. (1982). Self-efficacy mechanisms in human agency. *American Psychology, 37*, 122-147.

Bandura, A. (1986). *Social foundation of thought and actions: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.

Bandura, A. (2003). The primacy of self-regulation in health promotion. *Applied Psychology: An International Review*, *54*, 245-254.

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior, 31*, 143-164.

Barnes, P. J. (1999). Molecular genetics of chronic obstructive pulmonary disease. *Thorax*, *54*, 245-252.

Barnes, P. J. (2000). Inhaled corticosteroids are not beneficial in chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine, 161*, 342-344.

Barr, R. G., Celli, B., & Martinez, F., Ries, A., Rennard, S., Reilly, Jr., J., et al. (2005). Physician and patient perceptions in COPD: The COPD resource network needs assessment survey. *American Journal of Medicine, 118*, 1415.

Basch, C. E. (1985). Avoiding type II errors in health education program evaluations: A case study. *Health Education Quarterly*, *12*, 315-33.

Bednarek, M., Gorecka, D., Wielgomas, J., Czajkowska-Malinowska, M., Regula, J., Mieszko-Filipczyk, G., et al. (2006). Smokers with airway obstruction are more likely to quit smoking. *Thorax, 61***,** 869-873.

Behrendt, C. E. (2005). Mild and moderate-to-severe COPD in non-smokers: Distinct demographic profiles. *Chest, 128*, 1239-1244.

Belza, B., Steele, B. G., Cain, K., Coppersmith, J., Howard, J., & Lakshminarayan, S. (2005). Seattle obstructive lung disease questionnaire: Sensitivity to outcomes in pulmonary rehabilitation in severe pulmonary illness. *Journal of Cardiopulmonary Rehabilitation, 25*, 107-114.

Bettman, J. R. (1979). *An information processing theory of consumer choice*. Reading, MA: Addison-Wesley.

Blackstock, F., & Webster, K. E. (2006). Disease-specific health education for COPD: A systematic review of changes in health outcomes. *Health Education Research, 22*, 703-717.

Blake, R. L., Vandiver, T. A., Braun, S., Bertuso, D. D., & Straub, V. (1990). A randomized controlled evaluation of a psychosocial intervention in adults with chronic lung disease. *Family Medicine, 22***,** 365-70.

Blanco, I., de Serres, F. J., Fernandez-Bustillo, E., Lara, B., & Miravitlles, M. (2006). Estimated numbers and prevalence of PI*S and PI*Z alleles of alpha$_1$-antitrypsin deficiency in European countries. *European Respiratory Journal, 27*, 77–84.

Boot R. L., Joost, W. J., van der Gulden, J. W. J., van den Borne, B. H., Orbon, K. H., et al. (2005). Knowledge about asthma and COPD: Associations with sick leave, health complaints, functional limitation, adaptation, and perceived control. *Patient Education Counseling, 59*, 103-109.

Borg, S., Ericsson, A., Wedzicha, J., Gulsvik, A., Lundbäck, B., Donaldson, G. C., et al. (2004). A computer simulation model of the natural history and economic impact of chronic obstructive pulmonary disease. *Value in Health, 7*, 153-167.

Bourbeau, J. (2003). Disease-specific self-management programs in patients with advanced chronic obstructive pulmonary disease: A comprehensive and critical evaluation. *Disease Management & Health Outcomes*, *11*, 311-319.

Bourbeau, J. (2004). Self-management interventions to improve outcomes in patients suffering from COPD. *Expert Review of Pharmacoeconomics Outcomes Research, 4*, 71-77.

Bourbeau, J., Collet, J. P., Schwartzman, K., Ducruet, T., Nault, D., Bradley, C., et al. (2006). Economic benefits of self-management education in COPD. *Chest, 130*, 1704-1711.

Bourbeau, J., & Nault, D. (2007). Self-management strategies in chronic obstructive pulmonary disease. *Clinical Chest Medicine, 28*, 617-628.

Bourbeau, J., Julien, M., Maltais, F., Rouleau, M., Beaupré, A., Bégin, R., et al. (2003). Reduction of hospital utilization in patients with chronic obstructive pulmonary disease: A disease-specific self-management intervention. *Archives of Internal Medicine, 163*, 585-591.

Bourbeau, J., Nault, D., & Dang-Tan, T. (2004). Self-management and behavior modification in COPD. *Patient Education and Counseling*, *52*, 271- 277.

Boxall, A. M., Hons, L. B., Sayers, A., & Caplan, G. A. (2006). Managing chronic obstructive pulmonary disease in the community. *Journal of Cardiology Rehabilitation, 25*, 378-385.

Brooks, D., Lacasse, Y., & Goldstein, R. S. (1999). Pulmonary rehabilitation programs in Canada: National survey. *Canadian Respiratory Journal, 6*, 55–63.

Buist, A. S., McBurnie, M. A., Vollmer, W. M., Gillespie, S., Burney, P., Mannino, D. M., et al. (2007). International variation in the prevalence of COPD (The BOLD Study): A population-based prevalence study. *Lancet, 370***,** 741-749.

Burge, S., & Wedzicha, J. A. (2003). COPD exacerbations: Definitions and classifications. *European Respiratory Journal, 41*, 46s–53s.

Calverley, P. M. (2000). Inhaled corticosteroids are beneficial in chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine, 161*, 341-342.

Camp, P. G., Appleton, J., & Reid, W. D. (2000). Quality of life after pulmonary rehabilitation: Assessing change using quantitative and qualitative methods. *Physical Therapy*, *80*, 986-995.

Carley, K. (1993). Coding choices for textual analysis: A comparison of content analysis and map analysis. In P. Marsden (Ed.), *Sociological methodology* (pp. 75-126). Oxford: Blackwell.

Carlson, M. L., Ivnik, M. A., Dierkhising, R. A. O'Byrne, M. M., & Vickers, K. S. (2006). A learning needs assessment of patients with COPD. *Medical Surgery & Nursing*, *15*, 204-212.

Carrieri-Kohlman, V., Douglas, M. K., Gormley, J. M., & Stulbarg, M. S. (1993). Desensitization and guided mastery: Treatment approaches for the management of dyspnea. *Heart Lung, 22*, 226-234.

Celli, B., Cross, S., Grossman, R., Kardos, P., Erik Myrseth, S., Rodriguez-Roisin, R., et al. (2006). Improving the care of COPD patients: Suggested action points by the

COPD exacerbations taskforce for reducing the burden of exacerbations of COPD. *Primary Care Respiratory Journal*, *15***,** 139-142.

Celli, B. R. (1995). Pulmonary rehabilitation in patients with COPD. *American Journal of Respiratory Critical Care Medicine, 152*, 861-864.

Celli, B. R., & MacNee, W. (2004). Standards for the diagnosis and treatment of patients with COPD: A summary of the ATS/ERS position paper. *European Respiratory Journal, 2*3, 932-946.

Celli, B. R., Cote, C. G., Marin, J. M., Casanova, C., Montes de Oca, M. Mendez, R. A., et al. (2004). The body-mass index, airflow obstruction, dyspnea, and exercise capacity index in chronic obstructive pulmonary disease. *New England Journal of Medicine, 350***,** 1005-1012.

Celli, B. R., Halbert, R. J., Nordyke, R. J., & Schan, B. (2005). Airway obstruction in never smokers: Results from the third national health and nutrition examination survey. *American Journal of Medicine, 118*, 1364-1372.

Chaouat, A., Weitzenblum, E., Kessler, R., Charpentier, C., Enrhart, M., Schott, R., et al. (1999). A randomized trial of nocturnal oxygen therapy in chronic obstructive pulmonary disease patients. *European Respiratory Journal, 14*, 1002-1008.

Chatila, W. M., Wynkoop, W. A., Vance, G., & Criner, G. J. (2004). Smoking patterns in African Americans and Whites with advanced COPD. *Chest*, *125*, 15-21.

Cicutto, L. C., & Brooks, D. (2006). Self-care approaches to managing chronic obstructive pulmonary disease: A provincial survey. *Respiratory Medicine, 100*, 154-164.

Cicutto, L. C., Brooks, D., & Henderson, K. (2004). Self-care issues from the perspective of individuals with chronic obstructive pulmonary disease. *Patient Education and Counseling, 55*, 168-176.

Clark, N. M, & Dodge, J. A. (1999). Exploring self-efficacy as a predictor of disease management. *Health Education and Behavior, 26*, 72-89.

Clark, N. M., Nothwehr, F., & Gong, M. (1995). Physician-patient partnership in managing chronic illness. *Academic Medicine, 70*, 957-959.

Cleland, J. A., Lee, A. J., & Hall, S. (2007). Associations of depression and anxiety with gender, age health-related quality of life and symptoms in primary care COPD patients. *Family Practice*, *24*, 217-223.

Cockcroft, A., Bagnall, P., Heslop, A., Andersson, N., Heaton, R., Batstone, J., et al. (1987). Controlled trial of respiratory health worker visiting patients with chronic respiratory disability. *British Medical Journal, 294*, 225-228.

Constantinidou, F., & Baker, S. (2002). Stimulus modality and verbal learning performance in normal aging. *Brain and Language*, *82*, 296-311.

Coultas, D., Frederick, J., Barnett, B., Singh, G., & Wludyka, P. (2005). A randomized trial of two types of nurse-assisted home care for patients with COPD. *Chest, 128*, 2017-2024.

Creer, T., Renne, C., & Christian, W. (1976). Behavioral contributions to rehabilitation and childhood asthma. *Rehabilitation Literature, 37*, 226-232.

Croxton, T. L., & Bailey, W. C. (2006). Long-term oxygen treatment in chronic obstructive pulmonary disease: Recommendations for future research—an

NHLBI workshop report. *American Journal of Respiratory Critical Care Medicine, 174,* 373-378.

Curtis, J. R., & Patrick, D. L. (2003). The assessment of health status among patients with COPD. *European Respiratory Journal, 21*, 36s-45s.

Curtis, J. R., Deyo, R. A., & Hudson, L. D. (1994). Health-related quality of life among patients with chronic obstructive pulmonary disease. *Thorax, 49*, 162-170.

Dahl, R., Greefhorst, L. A., Nowak, D., Nonikov, V., Byrne, A. M., Thomson, M. H., et al. (2001). Inhaled formoterol dry powder versus ipratropium bromide in chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine, 164*, 778-784.

Davis, A. H. T., Carrieri-Kohlman, V., Janson, S. L., Gold, W. M, & Stulbarg, M. S. (2006). Effects of treatment on two types of self-efficacy in people with chronic obstructive pulmonary disease. *Journal of Pain and Symptom Management, 32*, 60-70.

DeBusk, R. F., Miller, N. H., Superko, H. R., Dennis, C. A., Thomas, R. J., Lew, H. T., et al. (1994). A case-management system for coronary risk factor modification. *Annals of Internal Medicine, 120*, 721-729.

Decramer, M., Lacquet, L. M., Fagard, R., & Rogiers, P. (1994). Corticosteroids contribute to muscle weakness in chronic airflow obstruction. *American Journal of Respiratory Critical Care Medicine, 150*, 11-16.

Denzin, N. K., & Lincoln, Y. S. (2005). Introduction: The discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (3rd ed.; pp. 1-32). Thousand Oaks, CA: Sage.

de Torres, J. P., Casanova, C., Hernandez, C., Abreu, J., Aguirre-Jaime, A., & Celli, B. R. (2005). Gender and COPD in patients attending a pulmonary clinic. *Chest, 128,* 2012-2016.

Dockery, D. W., & Brunekreef, B. (1996). Longitudinal studies of air pollution effects on lung function. *American Journal of Respiratory Critical Care Medicine, 154*, S250-S256.

Domagala-Kulawik, J., Maskey-Warzechowska, M., Kraszewska, I., & Chazan, R. (2003). The cellular composition and macrophage phenotype in induced sputum in smokers and ex-smokers with COPD. *Chest, 123*, 1054-1059.

Dowson, C. A., Town, G. I., Frampton, C. & Mulder, R. T. (2004). Psychopathology and illness beliefs influence COPD self-management. *Journal of Psychosomatic Research, 56*, 333–340.

Dugard, P., & Todman, J. (1995). Analysis of pre-test-post-test control group designs in educational research. *Educational Psychology, 15*, 181-198.

D’Zurilla, T. (1986). *Problem solving therapy*. New York: Springer.

Eakin, E. G., & Glasgow, R. E. (1997). The patients’perspective on the self-management of chronic obstructive pulmonary disease. *Journal of Health Psychology, 2*, 245-253.

Eakin, E. G., Sassi-Dambron, D., Kaplan, R. M., & Ries, A. L. (1992). Clinical trial of rehabilitation in chronic obstructive pulmonary disease: Compliance as a medicator of change in exercise endurance. *Journal of Cardiopulmonary Rehabilitation, 12*, 105-110.

Ebrahim, S., & Smith, G. D. (1997). Systematic review of randomised controlled trials of multiple risk factor interventions for preventing coronary heart disease. *British Medical Journal, 314*, 1666-1674.

Eisner, M. D., Balmes, J., Katz, B. P., Trupin, L., Yelin, E., & Blanc, P. (2005). Lifetime environmental tobacco smoke exposure and the risk of chronic obstructive pulmonary disease. *Environmental Health Perspectives, 4*, 7-15.

Effing, T., Monninkhof, E. M., van der Valk, P. D. L. P. M., van der Palen, J., van Herwaarden, C. L. A., Partridge, M. R., et al. (2007). Self-management education for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database of Systematic Reviews 2007*, *4,* 1-398.

Elkington, H., & White, P. (2002). Chronic obstructive pulmonary disease and primary care. *British Journal of General Practice, 52*, 532–534.

Emery, C. F., Schein, R. L., Hauck, E. R., & MacIntyre, N. R. (1998). Psychological and cognitive outcomes of a randomized trial of exercise among patients with chronic obstructive pulmonary disease. *Health Psychology, 17*, 232-240.

Endicott, L., Corsello, P., Prinzi, M., Tinkelman, D., & Schwartz, A. (2003). Operating a sustainable disease management program for chronic obstructive pulmonary disease (COPD). *Lippincott's Case Management, 8*, 252-262.

Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, & Computers*, *28*, 1-11.

European Respiratory Society. (2003). *European lung white book*. Huddersfield, UK: European Respiratory Society Journals.

EuroQol Group. (1990). EuroQol-A new facility for the measurement of health-related quality of life. *Health Policy, 16*, 199-208.

Falter, L. B., Gignac, M., Brooks, D., & Cott, C. (2002). Adaptation to disability and perceptions of independence in older adults with COPD. *American Journal of Respiratory Critical Care Medicine, 165*, A110.

Fan, V., Curtis, J. R., MacDowell, M., & Fihn, S. D. (2002). Using quality of life to predict hospitalization and mortality in patients with obstructive lung diseases. *Chest, 122*, 429-436.

Fan, V. S., Reiber, G. E., Paula Diehr, P., Burman, M., McDonell, M. B., & Fihn, S. D. (2005). Functional status and patient satisfaction: A comparison of ischemic heart disease, obstructive lung disease, and diabetes mellitus. *Journal of General Internal Medicine, 20*, 452-459.

Feenstra, T. L., van Geugten, M. L., Hoogenveen, R. T., Wouters, E. F., & Molken, M. P. (2001). The impact of aging and smoking on the future burden of chronic obstructive pulmonary disease: A model analysis in The Netherlands. *American Journal of Respiratory Critical Care Medicine, 164*, 590-596.

Fein, A., & Fein, A. M. (2000). Management of acute exacerbations in chronic obstructive pulmonary disease. *Current Opinion in Pulmonary Medicine, 6*, 122-126.

Ferrer, M., Alonso, J., Morera, J., Marrades, R. M., Khalaf, A., Aguar, M. C., et al. (1997). Chronic obstructive pulmonary disease stage and health-related quality of life. *Annals of Internal Medicine, 127*, 1072–1079.

Ferrini, R., Edelstein, S., & Barrett-Corron, E. (1994). The association between health beliefs and heath behavior change in older adults. *Preventive Medicine, 23*, 1-5.

Finkelstein, S. M., & Ratner, E. (2006). Managing chronic disease through home telehealth. *Minnesota Medical Journal*, *89*, 42-45.

Foster, T. S., Miller, J. D., Marton, J. P., Caloyeras, M. W., Caloyeras, J. P., Russel, M. W., & Menzin, J. (2006). Assessment of the economic burden of COPD in the US: A review and synthesis of the literature. *COPD: Journal of Chronic Obstructive Pulmonary Disease*, *3***,** 211-218.

Friedman, M., & Hilleman, D. (2001). Economic burden of chronic obstructive pulmonary disease: Impact of new treatment options. *Pharmaeconomics, 19*, 245-254.

Fukuchi, Y., Nishimura, M., Ichinose, M., Adachi, M., Nagai, I., Kuriyama, T., et al. (2004). COPD in Japan: The nippon COPD epidemiology study. *Respirology, 9*, 458-465.

Journal, 26, 853-857.

Gallefoss, F. (2004). The effects of patient education in COPD in a one year follow-up randomised controlled trial. *Patient Education and Counseling, 52*, 259-266.

Gallefoss, F., Bakke, P. S., & Rsgaard, P. K. (1999). Quality of life assessment after patient education in a randomized controlled study on asthma and chronic obstructive pulmonary disease. *American Journal of Respiratory and Critical Care Medicine, 159*, 812-817.

George, J., Kong, D. C. M., Thoman, R., Physio, P., & Stewart, K. (2005). Factors associated with medication nonadherence in patients with COPD. *Chest, 128*, 3198-3204.

Gilson, B. S., Gilson, J. S., Bergner, M., Bobbit, R. A., Kressel, S., Pollard, W. E., et al. (1975). The sickness impact profile. Development of an outcome measure of health care. *American Journal of Public Health, 65*, 1304-1310.

Glanz, K., & Eriksen, M. P. (1993). Individual and community models for dietary behavior change. *Journal of Nutrition Education, 25*, 80-86.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Chicago: Aldine.

Gore, J. M., Brophy, C. J., & Greenstoe, M. A. (2000). How well do we care for patients with end stage chronic obstructive pulmonary disease (COPD)? A comparison of palliative care and quality of life in COPD and lung cancer. *Thorax, 55*, 1000-1006.

Gorecka, D., Gorzelak, K., Sliwinski, P., Tobiasz, M., & Zielinski, J. (1997). Effect of long-term oxygen therapy on survival in patients with chronic obstructive pulmonary disease with moderate hypoxaemia. *Thorax, 52*, 674-679.

Gormley, J., Carrieri-Kohlman, V., Douglas, M., & Stulbarg, M. (1993). Treadmill self-efficacy and walking performance in patients with COPD. *Journal of Cardiopulmonary Rehabilitation, 13*, 424-431.

Gosselink, R. (2004). Breathing techniques in patients with chronic obstructive pulmonary disease (COPD). *Chronic Respiratory Disease, 1*, 163-72.

Gosselink, R., Troosters, T., & Decramer, M. (1997). Exercise training in COPD patients: The basic questions. *European Respiratory Journal, 10*, 2884-2891.

Gourley, G. A., Portner, T. S., Gourley, D. R., Rigolosi, E. L., Holt, J. M., Solomon, D. K., et al. (1998). Humanistic outcomes in the hypertension and COPD arms of a multicenter outcomes study. *Journal of the American Pharmaceutical Association, 38*, 586-597.

Green, L. W., & Lewis, F. M. (1986). *Measurement and Evaluation in Health Education and Health Promotion*. Palo Alto, CA: Mayfield Publishing Company.

Griffiths, T., Phillips, C. J., Davies, S., Burr, M., & Campbell, I. (2001). Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme**.** *Thorax*, *56*, 779-784.

Gross, N. J. (2001). The GOLD standard for chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine, 163*, 1047–1048.

Guyatt, G. H., Berman, L. B., Townsend, M., Pugsley, S. O. & Chambers, L. W. (1987). A measure of quality of life for clinical trials in chronic lung disease, *Thorax, 42*, 773-778.

Guyatt, G. H., Feeny, D. H., & Patrick, D. L. (1993). Measuring health-related quality of life. *Annals of Internal Medicine, 118*, 622-629.

Guyatt, G. H., King, D. R., Feeny, D. H., Stubbing, D., & Goldstein, R. S. (1999). Generic and specific measurement of health-related quality of life in a clinical trial of respiratory rehabilitation. *Journal of Clinical Epimediology, 52*, 187-192.

Hajiro, T., Nishimura, M., Tsukino, A. I., Toru, O, & Takateru, I. (1999). A comparison of the level of dyspnea versus disease severity in indicating the health-related quality of life of patients with COPD. *Chest, 116*, 1632-1637.

Halbert, R. J., Natoli, J. L., Gano, A., Badamgarav, E., Buist, A. S., & Mannino, D. M. (2006). Global burden of COPD: Systematic review and meta-analysis. *European Respiratory Journal, 28*, 523-532.

Hardie, J. A., Buist, A. S., Vollmer, W. M., Ellingsen, I., Bakke, P. S., & Morkve, O. (2002). Risk of over-diagnosis of COPD in asymptomatic elderly neversmokers. *European Respiratory Journal, 20*, 1117-1122.

Hesselink, A. E., van der Windt, D. A., Pennix, B. W., Wijnhoven, H. A. H., Twisk, J. W. R., Bouter, L. M., et al. (2006). What predicts change in pulmonary function and quality of life in asthma or COPD? *Journal of Asthma, 43*, 513-519.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal, 327,* 557-560.

Hilleman, D. E., Dewan, N., Malesker, M., & Friedman, M. (2000). Pharmacoeconomic evaluation of COPD. *Chest, 118*, 1278-1285.

Hnizdo, E., Sullivan, P. A., Bang, K. M., & Wagner, G. (2002). Association between chronic obstructive pulmonary disease and employment by industry and occupation in the U.S. population: A study of data from the Third National Health and Nutrition Examination Survey. *American Journal of Epidemiology*, *156*, 738-746.

Holman, H., & Lorig, K. (1992). Perceived self-efficacy in self-management of chronic disease, in Schwarzer R. (Ed.): *Self-efficacy: Thought Control of Action*. Washington, DC, Hemisphere.

Howland, J., Nelson, E. C., Barlow, P. B., McHugo, G., Meier, F. A., Brent, P., et al. (1996). Chronic obstructive airway disease. Impact of health education. *Chest, 90*, 233-238.

Huberty, C. J, & Olejnik, S. (2006). *Applied MANOVA and discriminant analysis* (2nd ed.). John Wiley & Sons, Inc.: Hoboken, NJ.

Huck, S. W., & McLean, R. A. (1975). Using a repeated measures ANOVA to analyze data from a pretest-posttest design: A potentially confusing task. *Psychological Bulletin, 82*, 511-518.

Hunter, D. J., & Fairfield, G. (1997). Disease management. *British Medical Journal, 315*, 50-53.

Hurst, N. P., Kind, P., Ruta, D., Hunter, M., & Stubbings, A. (1997). Measuring health-related quality of life in rheumatoid arthritis: Validity, responsiveness and reliability of EuroQol (EQ-5D). *British Journal of Rheumatology, 36*, 551-559.

Hyland, M. E., Jones, R. C., & Hanney, K. (2005). The information needs of COPD patients: Why we developed the LINQ. *The Airways Journal,* 142-145.

Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J. M., Gavaghan, D. J., et al. (1996). Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Controlled Clinical Trials, 17*, 1-12.

Jemal, A., Ward, E., Hao, Y., & Thun, M. (2005). Trends in the leading causes of death in the United States, 1970–2002. *Journal of the American Medical Association, 294*, 1255-1259.

Johannessen, A., Omenaas, E. R., Bakke, P. S., & Gulsvik, A. (2005). Implications of reversibility testing on prevalence and risk factors for chronic obstructive pulmonary disease: A community study. *Thorax, 60,* 842-847.

Jones, P. W. (2001). Health status measurement in chronic obstructive pulmonary disease. *Thorax, 56*, 880-887.

Jones, P. W., & Bosh, T. K. (1997). Quality of life changes in COPD patients treated with salmeterol. *American Journal of Respiratory Critical Care Medicine, 155,* 1283-1289.

Jones, P. W., Quirk, F. H., Baveystock, C. M., & Littlejohns, P. (1992). A self-complete measure of health status for chronic airflow limitation. The St. George's

Respiratory Questionnaire. *American Review of Respiratory Disease, 145*, 1321-1327.

Jones, R. C. M., Hyland, M. E., Hanney, K., & Erwin, J. (2004). A qualitative study of compliance with medication and lifestyle modification in chronic obstructive pulmonary disease (COPD). *Primary Care Respiratory Journal, 13*, 149–154.

Kaplan , R. M., & Ries, A. L. (2005). Quality of life as an outcome measure in pulmonary diseases. *Journal of Cardiopulmonary Rehabilitation, 25*, 321-331.

Kaplan, R., Atkins, C., & Reinsch, S. (1984a). Specific efficacy expectation medication exercise compliance in patients with COPD. *Health Psychology, 3*, 223-242.

Kaplan, R. M., Atkins, C. J., & Timms, R. (1984b). Validity of a quality of well-being scale as an outcome measure in chronic obstructive pulmonary disease. *Journal of Chronic Diseases, 37,* 85–95.

Kaplan, R. M., Ries, A. L., Prewitt, L. M., & Eakin, E. (1994). Self-efficacy expectations predict survival for patients with chronic obstructive pulmonary disease. *Health Psychology, 13*, 366-368.

Kara, M., & Asti, T. (2004). Effect of education on self-efficacy of Turkish patients with chronic obstructive pulmonary disease. *Patient Education and Counseling, 55*, 114-120.

Keller, K. L., Sliepcevich, E. M., Vitello, E. M., Lacey, E. P., & Wright, W. R. (1987). Assessing beliefs and needs of senior citizens using the focus group interview: A qualitative approach. *Health Education Quarterly, 18*, 44-49.

Kersten, S. (2001). Chronic obstructive pulmonary disease in a managed care setting. *Disease Management and Health Outcomes, 9*, 589-599.

Killian, K. J. E., Summer, N., Jones, L., &.Campbell, E. J. (1992). Dyspnea and leg effort during incremental cycle ergometry. *American Review of Respiratory Disease, 145*, 1339-1345.

Kim, S. J., Suk, M. H., Choi, H. M., Kimm, K. C., Jung, K. H., Lee, S. Y., et al. (2006). The local prevalence of COPD by post-bronchodilator GOLD criteria in Korea. *The International Journal of Tuberculosis and Lung Disease, 10***,** 1393-1398.

Kind, P., Dolan, P., Gudex, C., & Williams, A. (1998). Variations in population health status: Results from a United Kingdom national questionnaire survey. *British Medical Journal, 316*, 736-741.

Kohler, C. L., Fish, L., & Greene, P. G. (2002). The relationship of perceived self-efficacy to quality of life in chronic obstructive pulmonary disease. *Health Psychology, 21*, 610-614.

Kohler, D., Fischer, J., Raschke, F., & Schönhofer, B. (2003). Usefulness of GOLD classification of COPD severity. *Thorax, 58***,** 825.

Kojima, S., Sakakibara, H., & Motani, S. (2007). Incidence of chronic obstructive pulmonary disease, and the relationship between age and smoking in a Japanese population. *Journal of Epidemiology, 17***,** 54-60.

Koning, C. J., Maille, A. R., Stevens, I., & Dekker, F. W. (1995). Patients’ opinions on respiratory care: Do doctors fulfill their needs? *Journal of Asthma, 32*, 355-363.

Krueger, R. A. (2000). *Focus groups: A practical guide for applied research*. 3rd ed., Thousand Oaks, CA: Sage.

Kunik, M. E., Roundy, K., & Veazy, C. (2005). Suprisingly high prevalence of anxiety and depression in chronic breathing disorders. *Chest, 127*, 1205-1211.

Lacasse, Y., Goldstein, R., Lasserson, T. J., & Martin, S. (2002). *Cochrane Database of Systematic Reviews*, *3*, Art. No.: CD003793. DOI: 10.1002/14651858.CD003793.pub2

Lawlor, D. A., Ebrahim, S., & Davey, S. G. (2004). Association between self-reported childhood socioeconomic position and adult lung function: Findings from the British Women's Heart and Health Study. *Thorax*, *59*, 199-203.

Leech, N. L., & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools: A call for data analysis triangulation. *School Psychology Quarterly, 22*, 557-584.

Leidy, K., & Haase, J. (1996). Functional performance in people with chronic obstructive pulmonary disease: A qualitative analysis. *Advanced Nursing Science, 18*, 77-89.

Littlejohns, P., Baveystock, C. M., Parnell, H., & Jones, P. (1991). Randomised controlled trial of the effectiveness of a respiratory health worker in reducing impairment, disability, and handicap due to chronic airflow limitation. *Thorax, 46,* 559-564.

Lopez, A. D., Mathers, C. D., Ezzati, M., Jamison, D. T., & Murray, C. J. L. (2006). *Global burden of disease and risk factors*. Washington, DC: The World Bank.

Lorig, K. (1996). Chronic disease self-management: A model for tertiary prevention. *American Behavioral Scientist, 39*, 676-683.

Lorig, K., Gonzalez, V., & Ritter, P. (1999). Community-based Spanish language arthritis education program: A randomized trial. *Medical Care, 37*, 957-963.

Lorig, K., Stewart, A., Ritter, P., Gonzalez, V., Laurent, D., & Lynch, J. (1996). *Outcome measures for health education and other health care interventions*. Thousand Oaks, CA: Sage Publications.

Lorig, K., Ung, E., Chastain, R., Shoor, S., & Holman, H. (1989). Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis & Rheumatism, 32*, 37-44.

Lorig, K. R., & Holman, H. R. (2003). Self-management education: History, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine, 26*, 1-7.

Lorig, K. R., Sobel, D. S., Ritter, P. L., Laurent, D., & Hobbs, M. (2001). Effect of a self-management program for patients with chronic disease. *Effective Clinical Practice*, *4*, 256-262.

Maes, S., & Karoly, P. (2005). Self-regulation assessment and intervention in physical health and illness: A review. *Applied Psychology: An International Review, 54*, 245-277.

Mahler, D. A. (2000). How should health-related quality of life be assessed in patients with COPD? *Chest, 117*, 54S-57S.

Mannino, D. M., & Buist, A. S. (2007). Global burden of COPD: Risk factors, prevalence, and future trends. *Lancet, 370*, 765-773.

Mannino, D. M., & Davis, K. J. (2006). Lung function decline and outcomes in an elderly population. *Thorax, 61,* 472-477.

Mannino, D. M., Homa, D. M., Akinbami, L. J., Ford, E. S., & Redd, S. C. (2002). Chronic obstructive pulmonary disease surveillance: United States, 1971–2000. *Respiratory Care, 47,* 1184-1199.

Mannino, D. M., Watt, G., & Hole, D. (2006). The natural history of chronic obstructive pulmonary disease. *European Respiratory Journal, 27,* 627-643.

Mapel, D. W., Hurley, J. S., Frost, F. J., Petersen, H. V., Picchi, M. A., & Coultas, D. B. (2000). Health care utilization in chronic obstructive pulmonary disease: A case-control study in a health maintenance organization. *Archives of Internal Medicine, 160*, 2653-2658.

Marks, G. B., Yates, D. H., Sist, M., Ceyhan, B., De Campos, M, Scott, D. M., et al. (1996). Respiratory sensation during bronchial challenge testing with methacholine, sodium metabisulphite and adenosine monophosphate. *Thorax, 51,* 793-798.

Martin, I. R., McNamara, D., Sutherland, F. R., Tilyard, M. W., & Taylor, D. R. (2004). Care plans for acutely deteriorating COPD: A randomized controlled trial. *Chronic Respiratory Disease, 1*, 191-195.

Maxwell, J. A. (2005). *Qualitative research design: An interactive approach* (2nd. ed.). Newbury Park, CA: Sage.

Mazzuca, S. A. (1982). Does patient education in chronic disease have therapeutic value? *Journal of Chronic Disease, 35*, 521-529.

McDowell, I., & Newell, C. (1996). *Measuring health: A guide to rating scales and questionnaires.* New York: Oxford University Press.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*, 351-377.

Mehran, R. J., & Deslauriers, J. (1995). Indications for surgery and patient work-up for bullectomy. *Chest Surgery Clinics of North America, 5*, 717–734.

Menezes, A. M., Perez-Padilla, R., & Jardim, J. R. (2005). Chronic obstructive pulmonary disease in five Latin American cities (the PLATINO study): A prevalence study. *Lancet, 366*, 1875-1881.

Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology, 52*, 500-510.

Michaud, C. M., Murray, C. J., & Bloom, B. R. (2001). Burden of disease—implications for future research. *Journal of the American Medical Association, 285*, 535-539.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Miller, R. M, George, D., & Halbert, R. J. (2005). Improving the management of chronic obstructive pulmonary disease. *Journal of Healthcare Quality, 27*, 42-47.

Monninkhof, E., van der Valk, P., van der Palen, J., van Herwaarden, C., & Zielhuis, G. (2003a). Effects of a comprehensive self-management programme in patients with chronic obstructive pulmonary disease. *European Respiratory Journal, 22*, 815-820.

Monninkhof, E., van der Valk, P., van der Palen, J., van Herwaarden, C. Partridge, M. R., & Zielhuis, G. (2003b). Self-management education for patients with chronic obstructive pulmonary disease: A systematic review. *Thorax*, *58*, 394–398.

Monninkhof, E., van der Aa, M., van der Valk, P., van der Palen, J., Zielhuis, G., Koning, K., et al. (2004a). A qualitative evaluation of a comprehensive self-management programme for COPD patients: Effectiveness from the patients' perspective. *Patient Education and Counseling, 55*, 177-184.

Monninkhof, E., van der Valk, P., Schermer, T., van der Palen, J., van Herwaarden, C., & Zielhuis, G. (2004b). Economic evaluation of a comprehensive self-management programme in patients with moderate to severe chronic obstructive pulmonary disease. *Chronic Respiratory Disease, 1*, 7-16.

Moore, M. (1990). Background and overview of contemporary American distance education. In M. Moore (Ed.) *Contemporary issues in American distance education* (pp. xii-xxvi). New York: Pergamon.

Morgan, D. L. (1997). *Focus groups as qualitative research*, *2nd ed.* Qualitative Research Methods Series 16. Thousand Oaks, CA: Sage.

Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative Health Research, 8*, 362-276.

Morse, J. M. (1994). Designing funded qualitative research. In: N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 220-235). Thousand Oaks, CA: Sage.

Murray, S. A., Boyd, K., & Sheikh, A. (2005). Palliative care in chronic illness. *British Medical Journal, 330*, 611–612.

National Association of Counties (2004). *Rural counties in Alabama*. Retrieved November 13, 2007, from http://quickfacts.census.gov/qfd/states/01/01023.html.

National Center for Health Statistics. (2006). *National Health Interview Survey, 2004* [Computer file]. ICPSR04349-v2. Hyattsville, MD: U.S. Dept. of Health and Human Services, National Center for Health Statistics.

National Center for Health Statistics. (2007). *FASTATS: Chronic obstructive pulmonary disease, 2004*. Retrieved October 22, 2007, from http://www.cdc.gov/nchs/fastats/copd.htm.

National Collaborating Centre for Chronic Conditions. (2004). Chronic obstructive pulmonary disease: National clinical guideline on management of chronic obstructive pulmonary disease in adults in primary and secondary care. *Thorax*, *59*, 1–232.

National Heart, Lung, & Blood Institute. (2007a). *Diseases and conditions index: COPD*. Retrieved on October 22, 2007, from http://www.nhlbi.nih.gov/health/dci/Diseases/Copd/Copd_All.html.

National Heart, Lung and Blood Institute. (2007b). *Breathing better with a COPD Diagnosis*. Retrieved October 23, 2007, from http://www.nhlbi.nih.gov/health/public/lung/copd/campaign-materials/html/copd-patient.htm.

Nault, D., Hamd, D., & Rouleau, M. (2002). A comprehensive educational program on COPD patient learning illness management skills. *American Journal of Respiratory Critical Care Medicine, 165*, A111.

Naunheim, K. S., Wood, D. E., Mohsenifar, Z., Sternberg, A. L., Criner, G. J., DeCamp, M. M., et al. (2006). Long-term follow-up of patients receiving lung-volume-reduction surgery versus medical therapy for severe emphysema by the National Emphysema Treatment Trial Research Group. *Annals of Thoracic Surgery, 82*, 431-443.

Neish, C. M., & Hopp, J. W. (1988). The role of education in pulmonary rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 11*, 439–441.

Nguyen, H. G., & Carrieri-Kohlman, V. (2005). Dyspnea self-management in patients with chronic obstructive pulmonary disease: Moderating effects of depressed mood. *Psychosomatics, 46*, 402-410.

Nguyen, H. G., Carrieri-Kohlman, V., Rankin, S. A., Slaughter, R., & Stulberg, M. S. (2003). Pilot study of an online dyspnea self-management program for COPD. *American Medical Informatics Association 2003 Symposium Proceedings*, 951.

Nici, L., Donner, C., Wouters, E., & Zuwallack, R. (2006). ATS/ERS Pulmonary Rehabilitation Writing Committee. American Thoracic Society / European Respiratory Society statement on pulmonary rehabilitation. *American Journal of Respiratory Critical Care Medicine, 173*, 1390-1413.

Norwood, R. (2006). Prevalence and impact of depression in chronic obstructive pulmonary disease patients. *Current Opinion in Pulmonary Medicine, 12*, 113-117.

O'Donnell, D. E., Aaron, S., Bourbeau, J., Hernandez, P., Marciniuk, D., Balter, M., et al. (2004). State of the art compendium: Canadian Thoracic Society recommendations for the management of chronic obstructive pulmonary disease. *Canadian Respiratory Journal*, *11*, 7B-59B.

O'Donnell, D. E., Revill, S. M., & Webb, K. A. (2001). Dynamic hyperinflation and exercise intolerance in chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine, 164*, 770-777.

Onwuegbuzie, A. J., Jiao, Q. G., & Bostick, S. L. (2004). *Library anxiety: Theory, research, and applications*. Lanham, MD: Scarecrow Press.

Onwuegbuzie, A. J., & Leech, N. L. (2004). Enhancing the interpretation of "significant" findings: The role of mixed methods research. *The Qualitative Report, 9*, 770-792.

Oostenbrink, J. B., Rutten-van Molken, M. P., Van Noord, J. A., & Vincken, W. One-year cost-effectiveness of tiotropium versus ipratropium to treat chronic obstructive pulmonary disease. *European Respiratory Journal, 23*, 241–249.

Patrick, D. L., & Erickson, P. (1993). *Health status and health policy: Quality of life in health care evaluation and resource allocation*. Oxford University Press: New York.

Pauwels, R. A., Buist, A. S., Calverley, P. M., Jenkins, C. R., & Hurd, S. S. (2001). GOLD Scientific Committee. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) workshop summary. *American Journal of Respiratory Critical Care Medicine, 163*, 1256-1276.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach*. Hillsdale, NJ: Erlbaum.

Pellegrino, R., Viegi, G., Brusasco, V., Crapo, R. O., Burgos, F., Casaburi, R., et al. (2005). Interpretative strategies for lung function tests. *European Respiratory Journal, 26*, 948-968.

Petty, T. L., Dempsey, E. C., Collins, T., Pluss, W., Lipkus, I., Cutter, G. R., et al. (2006). Impact of customized videotape education on quality of life in patients with chronic obstructive pulmonary disease. *Journal of Cardiology Rehabilitation*, *26*, 112-117.

Physiotherapy Evidence Database. (1999). PEDro scale. School of Physiotherapy, University of Sydney. Retrieved on October 31, 2007, from http://www.pedro.fhs.usyd.edu.au/scale_item.html.

Pitta, F., Troosters, T., Probst, V. S., Spruitt, M. A., Decramer, M., & Gosselink, R. (2006). Physical activity and hospitalization for exacerbation of COPD. *Chest*, *129*, 536-544.

Pitta, F., Troosters, T., Spruit, M. A., Probst, V. S., Decramer, M., & Gosselink, R. (2005). Characteristics of physical activity in chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care* Medicine, *171*, 972-977.

Puhan, M. A., Guyatt, G. H., & Goldstein, R. (2007). Relative responsiveness of the Chronic Respiratory Questionnaire, St. Georges Respiratory Questionnaire and four other health-related quality of life instruments for patients with chronic lung disease. *Respiratory Medicine, 101*, 308-316.

Rabe, K. F., Hurd, S., & Anzueto, A. (2007). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *American Journal of Respiratory and Critical Care Medicine, 176*, 532-555.

Rea, H., McAuley, S., Stewart, A., Lamont, C., Roseman, P., & Didsbury, P. (2004). A chronic disease management programme can reduce days in hospital for patients with chronic obstructive pulmonary disease. *Internal Medicine Journal, 34*, 608-614.

Reardon, J. Z., Lareau, S. C., & ZuWallack, R. (2006). Functional status and quality of life in chronic obstructive pulmonary disease. *The American Journal of Medicine, 119*, S32-S37.

Redman, B. K. (2004). *Advances in patient education*. New York: Springer Publishing Company.

Rennard, S. I., & Calverley, P. (2003). Rescue! Therapy and the paradox of the Barcalounger. *European Respiratroy Journal, 21*, 916-917.

Rennard, S. I., & Vestbo, J. (2006). COPD: The dangerous underestimate of 15%. *Lancet, 367,* 1216-1219.

Rimal, R. N. (2000). Closing the knowledge-behavior gap in health promotion: The mediating role of self-efficacy. *Health Communication, 12*, 219-237.

Rimal, R. N. (2001). Perceived risk and self-efficacy as motivators: Understanding individuals' long term use of health information. *Journal of Communication, 8*, 633-654.

Rudd, J., & Glanz, K. (1990). How individuals use information for health action and consumer information processing. In Glanz K, Lewis F, Rimer B, (Eds.). *Health behavior and health education: Theory, research and practice*. San Francisco, CA: Josey-Bass.

RVision™ Corporation. (2007). *COPD education*. Distributed by HealthIx; Golden, CO. Retrieved on October 23, 2007, from http://www.healthix.com/SearchResults.asp?Cat=5.

Sandelowski, M. (2001). Real qualitative researchers don't count: The use of numbers in qualitative research. *Research in Nursing & Health*, *24*, 230-240.

Scanlon, J. W., Horst, P., Nay, J. N., Schmidt, R. E., & Waller, J. D. (1977). Evaluability assessment: Avoiding type III and IV errors. In G. R. Gilbert, P. J. Conklin (Eds.). *Evaluation management: A source book of readings*. Charlottesville, VA: US Civil Service Commission.

Scanlon, P. D., Connett, J. E., Waller, L. A., Altose, M. D., Bailey, W. C., & Buist, A. C. (2000). Smoking cessation: Effect on symptoms, spirometry and future trends in COPD. *American Journal of Respiratory Critical Care Medicine, 161*, 381-990.

Scherer, Y. K., & Schmieder, L. E. (1997). The role of self-efficacy in assisting patients with chronic obstructive pulmonary disease to management breathing difficulty. *Clinical Nursing Research, 5*, 343-355.

Scherer, Y. K., Schmieder, L. E., & Shimmel, S. (1998). The effects of education alone and in combination with pulmonary rehabilitation on self-efficacy in patients with COPD. *Rehabilitation Nursing, 23*, 71-77.

Schwartz, J. (1995). Short term fluctuations in air pollution and hospital admissions of the elderly for respiratory disease. *Thorax, 50*, 531-538.

Schwartz, S., & Carpenter, K. M. (1999). The right answer for the wrong question: Consequences of type III error for public health research. *American Journal of Public Health, 89*, 1175-1180.

Sethi, S. (2000). Infectious etiology of acute exacerbations of chronic bronchitis. *Chest, 117*, S380-S385.

Sezer, H., Akkurt, I., Guler, N., Marakoglu, K., & Berk, S. (2006). A case-control study on the effect of exposure to different substances on the development of COPD. *Annals of Epidemiology, 16*, 59-62.

Shaw, J. W., Johnson, J. A., & Coons, S. J. (2005). US valuation of the EQ-5D health states: Development and testing of the D1 valuation model. *Medical Care*, *43,* 203-220.

Shohaimi, S., Welch, A., Bingham, S., Luben, R., Day, N., Wareham, N., et al. (2004). Area deprivation predicts lung function independently of education and social class. *European Respiratory Journal, 24,* 157-161.

Sin, D. D., McAlister, F. A., Paul Man, S. F., & Anthonisen, N. R. (2003). Contemporary management of chronic obstructive pulmonary disease. *Journal of the American Medical Association, 290*, 2301- 2312.

Smith, C. A., & Harrison, D. J. (1997). Association between polymorphism in gene for microsomal epoxide hydrolase and susceptibility to emphysema. *Lancet, 350*, 630-633.

Soler, J. J., Martinez-Garcia, M. A., Roamn, P., Orero, R., Terrazaz, S., & Martinez-Pechuan, A. (2006). Effectiveness of a specific program for patients with chronic obstructive pulmonary disease and frequent exacerbations. *Archives of Bronchoneumology, 42*, 501-508.

Soriano, J. R., Maier, W. C., Egger, P., Visick, G., Thakrar, B., Sykes, J., et al. (2000). Recent trends in physician diagnosed COPD in women and men in the UK. *Thorax, 55*, 789-794.

Spencer, S., Calverley, P. M., Sherwood, P., & Jones, P. W. (2001). Health status deterioration in patients with chronic obstructive pulmonary disease. *American Journal of Respiratory Critical Care Medicine*, *163*, 122–128.

Stage, K. B., Middelboe, T., & Pisinger, C. (2003). Measurement of depression in patients with chronic obstructive pulmonary disease (COPD). *Nordic Journal of Psychiatry, 57*, 297-301.

Stoller, J. K., & Aboussouan, L. S. (2005). Alpha$_1$-antitrypsin deficiency. *Lancet, 365*, 2225–2236.

Strassels, S. A., Smith, D. H., Sullivan, S. D., & Mahajan, P. S. (2001). The costs of treating COPD in the United States. *Chest, 119*, 344-352.

Strecher, V. J., McEvoy-Devellis, B., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. *Health Education Quarterly, 13*, 73-91.

Suhonen, R., Nenonen, H., Laukka, A., & Valimaki, M. (2005). Patients' informational needs and information received do not correspond in hospital. *Journal of Clinical Nursing, 14*, 1167-1176.

Sullivan, S. D., Ramsey, S. D., & Lee, T. A. (2000). The economic burden of COPD. *Chest, 117*, 5S-9S.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics, 4th ed.* Needham Heights, MA: Allyn & Bacon.

Tarpy, S. P., & Celli, B. R. (1995). Long-term oxygen therapy. *New England Journal of Medicine, 333,* 710-714.

Tate, P., Foulkes, J., Neighbour, R., Campion, P., & Field, S. (1999). Assessing physicians' interpersonal skills via videotaped encounters: A new approach for the Royal College of General Practitioners Membership examination. *Journal of Health Communication, 4*, 143-152.

Testa, M. A., & Simonson, D. C. (1996). Assessment of quality-of-life outcomes. *New England Journal of Medicine, 334*, 835-840.

Thompson, B. (1994, February). Why multivariate methods are usually vital in research: Some basic concepts. Paper presented as a featured speaker at the biennial meeting of the Southwestern Society for Research in Human Development, Austin, TX. (ERIC Document Reproduction Service No. ED367687)

Thompson, B. (2006). *Foundations of behavioral statistics: An insight-based approach*. New York: The Guilford Press.

Thompson, B., & Borello, G. M. (1985). The importance of structure coefficients in regression research. *Educational and Psychological Menasurement, 45*, 203-209.

Toshima, M. T., Kaplan, R. M., & Ries, A. L. (1992). Self-efficacy expectancies in chronic obstructive pulmonary disease rehabilitation. In: Schwarzer R, ed. *Self-efficacy: Thought control of action*. Washington, DC: Hemisphere.

Tougaard, L., Krone, T., Sorknaes, A., & Ellegard, H. (1992). Economic benefits of teaching patients with chronic obstructive pulmonary disease about their illness. *Lancet, 339*, 1517-1520.

Trupin, L., Earnest, G., San Pedro, M., Balmes, J. R., Eisner, M. D., Yelin, E., et al. (2003). The occupational burden of chronic obstructive pulmonary disease. *European Respiratory Journal, 22,* 462-469.

Tsang, A. H. (2000). *Effectiveness of three strengths of education and exercise on self-efficacy for walking and self-efficacy for managing dyspnea in patients with chronic obstructive pulmonary disease*. (Doctoral dissertation, University of California San Francisco, 2000).

Tsukino, M., et al. (2002). Change in generic and disease-specific health-related quality of life during a one-year period in patients with newly detected chronic obstructive pulmonary disease. *Respiration, 69*, 513-520.

Tu, S. P., McConell, M. B., Spertus, J. A., Steele, B. G., & Fihn, S. D.. (1997). A new self-administered questionnaire to monitor health-related quality of life in patients with COPD. *Chest, 112*, 614-622.

U.S. Department of Health and Human Services. (2000). *Healthy people 2010: Understanding and improving health, 2nd ed*. Washington, DC: US Government Printing Office, pp. 24-20.

U.S. Department of Health and Human Services. (2006a). *The health consequences of involuntary exposure to tobacco smoke: A report of the Surgeon General*. Atlanta: Department of Health and Human Services.

U.S. Department of Health and Human Services. (2006b). Centers for Disease Control and Prevention. *Advancing the nation's health: A guide to public health research needs, 2006-2015*. Retrieved on October 22, 2007, from http://www.cdc.gov/OD/science/PHResearch/cdcra/index.htm.

Van Agt, H. M. E., Essink-Bot, M. L., Krabbe, P. F. M., & Bonsel, G. J. (1994). Test-retest reliability of health state valuations collected with the EuroQol questionnaire. *Social Science Medicine, 39*, 1537-1544.

van der Palen, J., Monninkhof, E., & van der Valk, P. (2004). Managing COPD: No more nihilism! *Patient Education and Counseling, 52*, 221-223.

van Schayck, C. P., Rutten-van Molken, M. P., van Doorslaer, E. K., Folgering, H., & van Weel, C. (1992). Two-year bronchodilator treatment in patients with mild airflow obstruction. Contradictory effects on lung function and quality of life. *Chest, 102,* 1384-1391.

van Wynen, E. A. (2001). A key to successful aging: Learning-style patterns of older adults. *Journal of Geriatric Nursing, 27*, 6-15.

Vincken, W., van Noord, J. A., Greefhorst, A. P., Bantje, T. A., Kesten, S., Korducki, L., et al. (2002). Improved health outcomes in patients with COPD during 1 year's treatment with tiotropium. *European Respiratory Journal, 19*, 209-216.

Von Korff, M., Gruman, J., Schaefer, J., Curry, S. J., & Wagner, E. H. (1997). Collaborative management of chronic illness. *Annals of Internal Medicine, 127*, 1097-1102.

Wagner, E. H. (2004). Chronic disease care. *British Medical Journal*, *328***,** 177-78.

Ward, M. M., Javitz, H. S., Smith, W. M., & Bakst, A. (2000). Direct medical cost of chronic obstructive pulmonary disease in the USA. *Respiratory Medicine, 94*, 1123-1129.

Ware, Jr., J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection, *Medical Care, 30*, 473-483.

Watson, L., Vonk, J. M., Lofdahl, C. G., Pride, N., Pauwels, R., Laitinen, L., et al. (2006). Predictors of lung function and its decline in mild to moderate COPD in association with gender: Results from the Euroscop study. *Respiratory Medicine, 100,* 746-753.

Watson, P. B., Town, G. I., Holbrook, N., Dwan, C., Toop, L. J., & Drennan, C. J. (1997). Evaluation of a self-management plan for chronic obstructive pulmonary disease. *European Respiratory Journal, 10*, 1267-1271.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*, 548-573.

Weinfurt, K. P. (2000). Repeated measures analyses: ANOVA, MANOVA, and HLM. In L. G. Grimm & P. R. Yarnold (Eds.). *Reading and understanding more multivariate statistics*. Washington, DC: American Psychological Association.

Wennberg, J. E. (1990). Outcomes research, cost containment, and the fear of health care rationing. *New England Journal of Medicine, 323*, 1202-1204.

Weston-Eborn, R., & Sitzman, K. (2005) Creating teaching plans for the adult learner. *Home Healthcare Nurse, 23*, 192-194.

White, A. J., Gompertz, S., & Stockley, R. A. (2003). Chronic obstructive pulmonary disease. The aetiology of exacerbations of chronic obstructive pulmonary disease. *Thorax, 58*, 73-80.

White, R., Walker, P., Roberts, S., Kalisky, S., & White, P. (2006). Bristol COPD Knowledge Questionnaire (BCKQ) testing: What we teach patients about COPD. *Chronic Respiratory Disease*, *3* 123-131.

Wigal, J. K., Creer, T. L., & Kotses, H. (1991). The COPD self-efficacy scale. *Chest, 99*, 1193-1196.

Williams, S. J. (1989). Chronic respiratory illness and disability: A critical review of the psychosocial literature. *Social Science in Medicine, 28,* 791-803.

Woo, J., Chan, W., Mphil, F. Y., Chan, W. M., Hui, E., Lum, C. M., et al. (2006). A community model of group therapy for the older patients with chronic obstructive pulmonary disease: A pilot study. *Journal of Evaluation in Clinical Practice*, *12*, 523-531.

Wood-Baker, R., Walters, J., & Haydn Walters, E. (2006). A narrative review of the use of oral corticosteroids in the management of stable chronic obstructive pulmonary disease. *Respiratory Medicine: COPD Update, 1*, 88-95.

Worth, H., & Dhein, Y. (2004). Does patient education modify behaviour in the management of COPD? *Patient Education and Counseling, 52*, 267-270.

Wouters, E. F. (2003). Economic analysis of the confronting COPD survey: An overview of results. *Respiratory Medicine, 97*, S3–S14.

Wouters, E. F., Creutzberg, E. C., & Schols, A. M. (2002). Systemic effects in COPD. *Chest, 121*, 127S–130S.

Yang, I. A., Fong, K. M., Sim, E. H. A., Black, P. N., & Lasserson, T. J. (2007). Inhaled corticosteroids for stable chronic obstructive pulmonary disease. *Cochrane Database of Systematic Reviews, 2*(CD002991), DOI:10.1002/14651858.CD002991.pub2.

Yeh, M. L., Chen, H. H., Liao, Y. C., & Liao, W. Y. (2004). Testing the functional status model in patients with chronic obstructive pulmonary disease. *Journal of Advanced Nursing, 48*, 342-350.

Yohannes, A. M. (2005). Depression and COPD in older people: A review and discussion. *British Journal of Community Nursing, 10*, 42–46.

Yohannes, A. M, & Hardy, C. C. (2003). Treatment of chronic obstructive pulmonary disease in older patients: A practical guide. *Drugs and Aging, 20*, 209-228.

Zimmerman, B. W., Brown, S. T., & Bowman, J. M. (1996). A self-management program for chronic obstructive pulmonary disease: Relationship to dyspnea and self-efficacy. *Rehabilitation Nursing, 21*, 253-257.

Zock, J., Sunyer, J., Kogevinas, Kromhout, H., Burney, P., Maria Anto, J., et al. (2001). Occupation, chronic bronchitis and lung function in young adults: An international study. *American Journal of Respiratory Critical Care Medicine, 163*, 1572-1577.

APPENDIX A

VOLUNTEERS NEEDED FOR A FOCUS GROUP

“Efficacy of DVD Technology in COPD Self-Management Education of Rural Patients”

Focus group participants must be over the age of 50 and must suffer from Chronic Obstructive Pulmonary Disease (COPD).

The purpose of the focus groups will be to gather information about the COPD self-management learning needs of COPD patients.

Participation involves taking surveys about your disease and discussing how you would like to better manage your disease.

Time Commitment: One session will last approximately 1 hour. You will be reimbursed for your time and travel expenses in the amount of $20.

The focus groups will be conducted at Choctaw Urgent Care in Butler, AL.
For additional information contact, Wendy Ridgeway at 205-459-4488.

Principal Investigator: Mr. Michael Stellefson, M.S.
Texas A&M University, Department of Health and Kinesiology

APPENDIX B

CONSENT FORM

Efficacy of DVD Technology in COPD Self-Management Education of Rural Patients

You have been asked to participate in a focus group discussing the self-management of Chronic Obstructive Pulmonary Disease (COPD). You were selected to be a possible participant because you suffer from COPD and are a patient of Choctaw Urgent Care in Butler, Alabama. A total of 12 people will be asked to participate in this study. The purpose of this focus group is to assess the self-management learning needs of COPD patients treated at Choctaw Urgent Care.

If you agree to be in this study, you will be asked to discuss your disease and talk about ways in which you attempt to manage your disease. This focus group will involve 12 patients, who are over 55 years of age. The focus group interview will last approximately 1 hour. The risks associated with this study are minimal. There are no benefits associated with participation.

You will receive a $20 honorarium for participation in the focus group.

This focus group session will be videotaped and participation will not be permitted should you choose not to be videotaped. The video tapes will be accessed only by the principal investigator (Michael Stellefson) and will be used only for educational purposes. They will be erased following the study's completion. Furthermore, the records of this study will be kept private. No identifiers linking you to the study will be included in any sort of report that might be published. Research records will be stored securely and only Michael Stellefson will have access to the records. Your decision whether or not to participate will not affect your current or future relations with Texas A&M University or Choctaw Urgent Care. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable. You can withdraw at any time without your relations with the University, job, benefits, etc., being affected. If you have any questions, you can contact Michael Stellefson at (979) 458-0097 or mstell@hlkn.tamu.edu or James Eddy at (979) 458-2217 or jeddy@hlkn.tamu.edu.

This research study has been reviewed by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Melissa McIlhaney, IRB Program Coordinator, Office of Research Compliance, (979) 458-4067, mcilhaney@tamu.edu.

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.

Signature of Participant: ________________________________ Date: ___________________

APPENDIX C

FOCUS GROUP RUBRIC

Introduction

Good morning/afternoon, and welcome to our session. Thank you for taking the time to join our discussion of COPD patient education needs and self-care. My name is Michael Stellefson, and I am a doctoral student at Texas A&M University in College Station, Texas, and I am studying patient education needs for COPD self-management. Today I'd like to hear from you about how you view caring for yourself and your COPD and what types of topics you would like to learn more about pertaining to how you can care for your disease. You were selected for this discussion because you all have a diagnosis of COPD and you are treated here at Choctaw Urgent Care. I am very interested in your views of your disease and your experiences trying to manage your breathing.

Today we basically want to learn from you about how you live with COPD and what types of disease self-management activities you'd like to learn more about. Please feel free to share your point of view whatever it may be, as there are no wrong answers to my questions. Please try to speak one at a time and speak up whenever you want to add something to the discussion. I am tape recording our conversations so that I don't miss any of your comments. We will be on a first name basis, and your names will not be attached to any of your comments to ensure your confidentiality.

My role here is to ask questions and listen. I will be asking about 10 total questions, and I'll move the discussion from one question to the next. As you talk and discuss issues, I will be taking notes about what you are sharing, so even if I'm writing, please continue with your comments, as I am trying to listen to everything you are saying. Please share as much as you can, but leave time for everyone to have the opportunity to share their thoughts and feelings. Also, please feel free to talk with one another. I've placed name cards on the table in front of you so that we can all remember each other's names during the discussion. We'll be done by _____, and I'll leave a little time at the end so you can finish the surveys in front of you. So to start…

Questions

1. Think back and tell us when you were diagnosed with COPD, and how long you have been dealing with health problems because of your disease?

2. What types of daily activities do you wish that you could do but don't feel able to do anymore because of having COPD?

3. When you think about trying to take care of yourself with your disease, what types of activities do you think about doing?

FOCUS GROUP RUBRIC

4. Of these activities, what do you do, yourself, do to help take care of your disease (i.e. things that you do so you don't feel short of breath or ill)? What allows you to do these activities?

5. What new and/or different activities did you maybe try to do to manage your disease but maybe did not feel comfortable continuing because of discomfort or difficulty? Can you think of any specific barriers that prevent you from trying to take care of yourself?

6. What questions do you have regarding what you can do to help limit the problems that you experience because of COPD?

7. Of all of these activities that we just discussed, what type of self-treatment activity do you consider most important?

8. What would like to learn more about in terms of taking care of yourself with your disease? What advice could you give someone who was trying to determine what to teach a patient with COPD?

MEMBER CHECK

9. How well does this summary capture what we discussed today? Does what I said sound accurate?

10. Is there anything that we did not talk about today regarding how you take care of your COPD that you would like to mention?

APPENDIX D

TELEPHONE SCRIPT FOR POTENTIAL PARTICIPANTS

Hello **Patient Name**, this is **CUC staff member** from CUC. I was just calling to let you know that you have an opportunity to participate in a research study for patients with COPD. If you agree to participate in the study, you will be asked to complete two surveys over a two month period and possibly look over information about how you can breathe better with COPD. For your participation in this study, you will be eligible to receive $40 for your participation and also receive free educational material about managing COPD. Dr. Hensleigh greatly encourages her patients to take advantage of this opportunity. Would you be interested in participating?

If **No** – OK, well if you change your mind, please feel free to call me at the clinic at (205) 459-4488, and we can get you signed up.

If **Yes** - OK great. We will then send you a package in the mail soon containing information about this study. In this package, you will find a blank survey that you are asked to complete. Please fill out this survey, put it in the prepaid envelope that we will provide you in the package (at no cost to you). Then, please send it back to us in the mail.

OK. Please look over the information that is provided to you in the package. We will be contacting you again in a few months with another survey that we will be asking you to fill out once again. If you complete and return the survey that we are sending you now and the one we send you in a few months, we will pay you $40 for taking the time to complete these surveys and look over this information about COPD.

So it’s very important that you (a) look over any educational material that we mail to you and (b) complete and return the surveys that you are asked to fill out. If you do not, then we can not pay you for your time. Does this sound OK to you?

OK great! Thank you for participating, and you should receive the first package in the next couple of weeks. Good bye.

APPENDIX E

CONSENT FORM

Efficacy of DVD Technology in COPD Self-Management Education of Rural Patients

You have been asked to participate in a research study about the self-management of Chronic Obstructive Pulmonary Disease (COPD). You were selected to be a possible participant because you suffer from COPD and are a patient of Choctaw Urgent Care in Butler, Alabama. A total of 100 possible people have been asked to participate in this study. The purpose of this study is to examine the effects of using education to help self-manage COPD.

If you agree to be in this study, you will be asked to fill out two sets of surveys about your lung function and disease (one now and one in 8 weeks). This study will last over 8 weeks, and you will be asked to mail in your responses using prepaid envelopes that will be provided for you. Each survey will take approximately 20 minutes to complete. The benefit of participation is that you are eligible to receive $40 for filling out both surveys (one now and one in 8 weeks) and free educational material about COPD self-management.

This study is anonymous, and you will be assigned a unique identifying code which will be used throughout the study as your identifier. The records of this study will be kept private. No identifiers linking you to the study will be included in any sort of report that might be published. Research records will be stored securely and only Michael Stellefson and Dr. Katherine Hensleigh will have access to the records. Your decision whether or not to participate will not affect your current or future relations with Texas A&M University or Choctaw Urgent Care. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable. You can withdraw at any time without your relations with the University, job, benefits, etc., being affected. If you have any questions, you can contact Michael Stellefson at (979) 458-0097 or mstell@hlkn.tamu.edu.

This research study has been reviewed by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Melissa McIlhaney, IRB Program Coordinator, Office of Research Compliance, (979) 458-4067, mcilhaney@tamu.edu.

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.

Signature of Participant:___________________ Date: ___________________

APPENDIX F

SAMPLE INTRUCTIONS SENT TO TREATMENT GROUPS

Please look over the information contained in the **Pamphlet and/or on this DVD** as often as you can over the next few weeks. This information will help provide you with skills that you need to help you self-manage your COPD better. It is very important that you take the time to look over this important information until you feel comfortable practicing the skills which are shown. If you have any problems with viewing this information, please contact Wendy Ridgeway at (205) 459-4488, and she will be able to assist you.

I hope that you find this information beneficial to your health!

Sincerely,

Katherine A. Hensleigh, M.D.
President, Choctaw County Medical Society
Medical Director, Choctaw Urgent Care

SAMPLE INTRUCTIONS SENT TO TREATMENT GROUPS

Dear **Patient Name**,

My name is Michael Stellefson, and I am a graduate student studying health education at Texas A&M University in College Station, Texas. I am currently in the process of completing my final dissertation project for my PhD degree. The project is devoted to studying patients who have Chronic Obstructive Pulmonary Disease (COPD). I have been studying COPD in hopes that my research will help patients who suffer from the disease.

My project is taking place in your area of the country with patients who are cared for at Choctaw Urgent Care (CUC). Dr. Katherine Hensleigh, who is the Medical Director at CUC, has been kind enough to provide me with contact information for her patients who have COPD. Your name has been selected as a potential participant in this study. In order to participate, all you will have to do now is:

1. Complete the enclosed survey and return it in the pre-paid postage envelope that I have included in this mailing immediately, and
2. After completing this survey, please review over the enclosed DVD and printed educational material as often as you can over the next 6-8 weeks.

In approximately 8 weeks, I will mail you another survey for you to complete and return in a pre-paid postage envelope. After you send me back this 2nd and final survey, this study will be completed, and you will be eligible to receive **free educational products along with a $40 check for your participation**. If you have any questions about the project, please contact Wendy Ridgeway at (205) 459-4488. Your participation is greatly appreciated. Thank you very much!

Sincerely,

Michael Stellefson, M.S.
Graduate Student
Texas A&M University

Katherine A. Hensleigh, M.D.
Medical Director, Choctaw Urgent Care

APPENDIX G

LINQ

1. What sentence best describes what you have been told to do if your breathing gets worse (e.g., take two puffs instead of one)?

A. I have been told what to do and the doctor/nurse has given me written instructions
B. I have been told but it is not written on paper
C. I haven't been told but I know what to do
D. I haven't been told and I don’t know what to do

2. Have you been told when you should call an ambulance if your breathing worsens?

A. I have been told what to do and the doctor/nurse has given me written instructions
B. I have been told but it isn't written on paper
C. I haven't been told but I know what to do
D. I haven't been told and I am uncertain when an ambulance should be called

3. Has someone told you *how much* physical activity (e.g., walking, brisk walking and other forms of exercise) you should do?

A. Yes and I know what to do
B. Yes but I am unsure what to do
C. Yes but I am unable to do it
D. No

4. How much physical activity do you do?

A. As little as possible
B. I make an effort
C. I push myself as much as I can

5. Have you any questions or comments about your lung disease (If so, please write them in the space below)?

APPENDIX H

SOLQ

Please fill in the circle that best explains how your lung disease affects different aspects of your life.

1.	During the past 2 months, how often have your lung problems caused you to feel. *(fill in one oval on each line.)*							
		Never	**Almost Never**	**A Little of the Time**	**Some of the Time**	**A Good Bit of the Time**	**Most of the Time**	**All of the Time**
	Low in energy or tired	○	○	○	○	○	○	○
	Frightened when you had difficulty breathing	○	○	○	○	○	○	○
	Embarrassed by your coughing or heavy breathing	○	○	○	○	○	○	○
	You could not enjoy life	○	○	○	○	○	○	○

2.	The following items are about activities you might do during a typical day. Does your lung disease now limit you in these activities? If so, how much?					
	Activities	**Extremely Limited**	**Quite a Bit Limited**	**Moderately Limited**	**Slightly Limited**	**Not at All Limited**
	Vigorous activities, such as running, participating in strenuous sports (e.g., swimming, jogging, tennis)	○	○	○	○	○
	Lifting or moving heavy objects (e.g., furniture, children)	○	○	○	○	○
	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf	○	○	○	○	○
	Climbing several flights of stairs	○	○	○	○	○
	Lifting or carrying groceries	○	○	○	○	○
	Climbing a hill or **one** flight of stairs	○	○	○	○	○
	Bending, kneeling or stooping	○	○	○	○	○
	Walking more than a mile	○	○	○	○	○
	Walking **several blocks**	○	○	○	○	○
	Walking **one block**	○	○	○	○	○
	Bathing or dressing yourself	○	○	○	○	○
	Getting in or out of bed	○	○	○	○	○

SOLQ

3.	During the past 2 months, how short of breath were you while doing your... *(fill in one oval on each line.)*					
		Not at All	**Mildly**	**Somewhat**	**Moderately**	**Severely**
	Normal daily activities	○	○	○	○	○
	Most strenuous activities	○	○	○	○	○

4.	During the past 2 months, did your shortness of breath limit you while doing your...					
		Not at All	**Mildly**	**Moderately**	**Severely**	**I Couldn't Do Activities at All**
	Normal daily activities	○	○	○	○	○
	Most strenuous activities	○	○	○	○	○

5.	During the past 2 months, how often did you feel…							
		Never	**Almost Never**	**A Little of the Time**	**Some of the Time**	**A Good Bit of the Time**	**Most of the Time**	**All of the Time**
	Short of breath	○	○	○	○	○	○	○
	Afraid to exercise	○	○	○	○	○	○	○
	Afraid getting angry would worsen your breathing	○	○	○	○	○	○	○
	Worried you wouldn't be able to breathe at all	○	○	○	○	○	○	○
	Your breathing problems were out of control	○	○	○	○	○	○	○
	You were a burden on your family and friends	○	○	○	○	○	○	○

6.	How would you rate the following?					
		Poor	**Fair**	**Good**	**Very Good**	**Excellent**
	The explanation given by your doctor or health care provider about your breathing problems	○	○	○	○	○
	The current treatment for your breathing problems overall	○	○	○	○	○

7.	During the past 2 months, how often did you feel confident dealing with your breathing problems?						
	All of the time	**Most of the time**	**A good bit of the time**	**Some of the time**	**A little of the time**	**Almost never**	**Never**
	○	○	○	○	○	○	○

APPENDIX I

EQ-5D

By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility
I have no problems in walking about ☐
I have some problems in walking about ☐
I am confined to bed ☐

Self-Care
I have no problems with self-care ☐
I have some problems washing or dressing myself ☐
I am unable to wash or dress myself ☐

Usual Activities (*e.g. work, study, housework, family or leisure activities)*
I have no problems with performing my usual activities ☐
I have some problems with performing my usual activities ☐
I am unable to perform my usual activities ☐

Pain/Discomfort
I have no pain or discomfort ☐
I have moderate pain or discomfort ☐
I have extreme pain or discomfort ☐

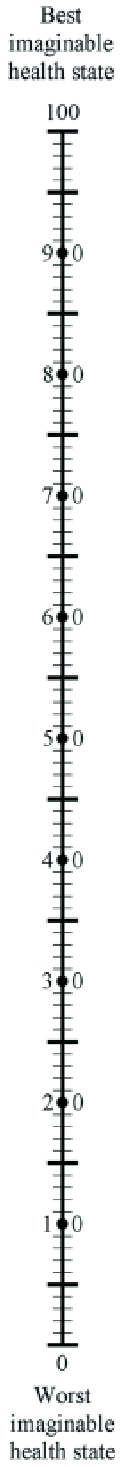
Anxiety/Depression
I am not anxious or depressed ☐
I am moderately anxious or depressed ☐
I am extremely anxious or depressed ☐

EQ-VAS

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today.

Your own health state today



APPENDIX J

SEMCD-6

1. How confident do you feel that you can keep the fatigue caused by your disease from interfering with the things you want to do?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

2. How confident do you feel that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

3. How confident do you feel that you can keep the emotional distress caused by your disease from interfering with the things you want to do?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

4. How confident do you feel that you can keep any other symptoms or health problems you have from interfering with the things you want to do?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

5. How confident do you feel that you can the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

6. How confident do you feel that you can do things other than just taking medication to reduce how much your illness affects your everyday life?

   not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

APPENDIX K

PROCESS EVALUATION MEASURES

We would like to learn about how you used the educational material that was provided to you. For each of the following questions, please answer the questions as accurately as possible.

1. Which of the following educational materials did you receive and review (mark an X for the best response)?

___________ Just a DVD

___________ Both a DVD and Pamphlet

___________ Just a Pamphlet

___________ None of the Above

2. If you received educational materials, please list the number of times that you referred to the materials that you were provided in the past few weeks (in the space provided): __________________

3. How useful was the educational material(s) that you were provided? Circle the best response from 1 to 10 (1 = not at all useful; 10 = extremely useful).

1	2	3	4	5	6	7	8	9	10
Not at all easy to use									Extremely easy to use

4. Did you find the educational material(s) easy to use (i.e., readable, understandable, easy to access)? Circle the best response from 1 to 10 (1 = not at all easy to use; 10 = extremely easy to use).

1	2	3	4	5	6	7	8	9	10
Not at all easy to use									Extremely easy to use

5. Please write any additional comments in the space below regarding how you felt about the educational material that you received (Did you like it? Was it beneficial to you? Would you like more information? Etc.):

Thank you very much (again) for your participation!

APPENDIX L

WRITTEN DEBRIEFING FORM

EFFICACY OF DVD TECHNOLOGY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE SELF-MANAGEMENT EDUCATION OF RURAL PATIENTS

Chronic Obstructive Pulmonary Disease (COPD) is a serious problem among adults. The proportion of individuals suffering from COPD is on the rise, and it is the 4th leading cause of death in the United States. Providing COPD patients with self-management education can have a positive impact on patient's confidence and ability to manage their disease. The questionnaires you answered included three measures of health related quality of life, one measure of lung information needs, and a measure of self confidence for managing your disease. The educational materials participants were exposed to included a DVD, Pamphlet or a combination of both. The purpose of this study was to measure and specifically compare the effect of these three different COPD self-management education strategies (and a control strategy which was no educational material) on relative differences in generic and disease-specific HRQoL, COPD information needs and COPD self-management self-efficacy.

Your generosity and willingness to participate in this study was greatly appreciated. Your input helped contribute to the advancement of the field of COPD self-management education research. I have provided your clinic with extra educational materials if you would like extra copies or are interested in learning more about COPD.

I ask you to maintain confidentiality about the purpose of the experiment. Thank you!

If you have any questions about this research, please feel free to contact Michael Stellefson at 717-645-3479 or mstell@hlkn.tamu.edu.

VITA

Name: Michael Leland Stellefson

Address: Department of Health and Kinesiology; TAMU 4243; College
Station, TX 77843

Email Address: mstell@hlkn.tamu.edu

Education: B.S., Psychology, University of Pittsburgh, 2004
M.S., Health Education, Texas A&M University, 2005
Ph.D., Health Education, Texas A&M University, 2008